Correlation Analysis of Postoperative Recurrence and Metastasis of Renal Cancer with Type 2 Diabetes Mellitus

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To analyze the correlation between alcohol consumption, smoking, duration of diabetes and postoperative recurrence and metastasis in renal cancer patients who underwent nephrectomy in our hospital from April 2018 to January 2020 were selected as the research subjects. According to the recurrence and metastasis of the patients within 2 y after the operation, the patients were divided into drinking, smoking and diabetes duration in recurrence and metastasis group and non-relapse and metastasis group was analyzed and Pearson correlation was used to analyze drinking, smoking and diabetes duration and renal cancer patients with type 2 diabetes after surgery correlation of recurrence and metastasis. The proportion of patients with drinking, smoking and diabetes duration ≥5 y in the recurrence and metastasis group. The results of the correlation analysis of postoperative recurrence and metastasis in patients with type 2 diabetes showed that drinking, smoking and the duration of diabetes were positively correlated with the occurrence of postoperative recurrence and metastasis in patients with renal cancer combined with type 2 diabetes (r=0.631, p=0.000; r=0.640, p=0.000; r=0.593 and p=0.000); logistic regression analysis showed that drinking, smoking and duration of diabetes were independent risk factors for postoperative recurrence and metastasis in patients with renal cancer complicated with type 2 diabetes (p<0.05). The drinking, smoking and duration of diabetes in renal cancer patients with type 2 diabetes are closely related to their recurrence and metastasis within 2 y after surgery. However, its specific mechanism of action still needs further research and verification.

Key words: Renal cancer, type 2 diabetes mellitus, postoperative recurrence, metastasis, drinking, smoking, duration of diabetes, correlation

Renal cancer occurs mostly in middle-aged and elderly people over 50 y old and most patients are clear cell carcinomas[1]. Its pathogenic factors are closely related to genetics, hypertension and chemical toxic substances[2]. There are no specific clinical symptoms in the early stage of renal cancer and it is relatively insidious. Some patients may have symptoms such as waist mass and pain. As the disease progresses, patients may also show intermittent painless gross hematuria. It can also directly endanger life[3,4]. Diabetes is a typical basic disease. In recent years, under the influence of diet and living habits, some renal cancer patients are accompanied by type 2 diabetes, which increases the difficulty of treatment and is not conducive to the recovery of patients[5]. At present, surgical treatment is performed for these patients under the condition of good blood sugar control and with the development and progress of imaging technology; the detection rate of early renal cancer has gradually increased, so that most patients can obtain the opportunity of radical surgery. Although most patients can benefit from it, the 5 y survival rate after surgery can reach 90 %, but some patients will still experience recurrence and metastasis after treatment, which seriously threatens the quality of life of patients[6,7]. Some scholars believe that drinking, smoking and the course of diabetes in patients with renal cancer and type 2 diabetes may be involved in the recurrence and metastasis of postoperative disease, but there are few reports at this stage[8]. Based on this, this study retrospectively analyzed the clinical data of patients

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with renal cancer complicated with type 2 diabetes and observed their drinking, smoking and diabetes duration and their correlation with postoperative recurrence and metastasis, in order to predict postoperative recurrence of renal cancer complicated with type 2 diabetes. The prevention and control of transfer can provide a certain reference basis. 221 patients with type 2 diabetes who underwent nephrectomy in our hospital from April 2018 to January 2020 were retrospectively analyzed. Inclusion criteria includes patients who were diagnosed with renal cancer by pathological examination in our hospital and meet the surgical indications; patients with complete clinical data and follow-up time of ≥2 y; patients without blood system diseases or chronic acute infection and no coagulation functionally disabled patients. Exclusion criteria include patients with bilateral renal tumors; patients who died during follow-up or lost to follow-up due to other reasons; patients with other tumors or severe cardiovascular and cerebrovascular diseases and communicating with patients. Collect the general clinical data of the selected subjects, including the age (years), gender (male/female), education level (below junior high school/junior high school and above), Body Mass Index (BMI) (kg/m^2), residence (urban/rural), hypertension (yes/no), coronary heart disease (yes/no), clinical symptoms (yes/no), tumor side (left kidney/right kidney), family history of tumor (yes/no), pathological type (clear cell carcinoma/papillary cell carcinoma/other) and Fuhrman grade (I~II/III~IV grade), data on drinking (yes/no), smoking (yes/no) and duration of diabetes (≥5/<5 y). Diabetes diagnosis including the refer to the relevant diagnostic criteria; smoking ≥1 cigarette per day and the duration of more than 6 mo can be judged as smoking; drinking frequency ≥1 time/day 4 w and continuous drinking for more than 1 mo can be judged as drinking; diastolic blood pressure ≥90 mmHg can be judged as hypertension; BMI, using "Chinese Adult Overweight and Obesity Prevention and Control" According to the relevant standards in the Guidelines, BMI>28 kg/m^2 means obesity and BMI>25 kg/m^2 means overweight. Statistical Package for the Social Sciences (SPSS) can processing such as age and BMI were described in ($\bar{x}\pm s$) and analyzed by t test, gender, education level, place of residence, hypertension, coronary heart disease, clinical symptoms, tumor side, tumor family history, pathology type, Fuhrman classification, drinking, smoking, duration of diabetes and other count data were analyzed by Chi-square (χ^2) test. Pearson correlation was used to analyze the correlation between drinking, smoking, duration of diabetes mellitus and postoperative recurrence, and metastasis of renal cancer patients with type 2 diabetes mellitus. Among the 221 renal cancer patients, 41 had recurrence and metastasis within 2 y after surgery and 180 did not, with a recurrence and metastasis rate of 18.55 % (41/221). BMI (kg/m^2) residence (urban/rural), hypertension (yes/no), coronary heart disease (yes/no), clinical symptoms (yes/no), tumor side (left kidney/right kidney), family history of tumor (yes/no), pathological type (clear cell carcinoma/papillary cell carcinoma/other) and Fuhrman grading (I~II/III~IV grade), there was no significant difference (p>0.05) as shown in Table 1. The proportion of patients with drinking, smoking and diabetes duration ≥5 y in the recurrence and metastasis group as shown in Table 2. The results of correlation analysis of drinking, smoking, duration of diabetes and postoperative recurrence and metastasis of renal cancer patients with type 2 diabetes showed that drinking, smoking and duration of diabetes were positively correlated with the occurrence of postoperative recurrence and metastasis of renal cancer patients with type 2 diabetes (r=0.631, p=0.000; r=0.640, p=0.000; r=0.593 and p=0.000) as shown in Table 3. Taking the recurrence and metastasis of renal cancer patients with type 2 diabetes as the dependent variable (no=0, yes=1) and the independent variables of drinking, smoking and the duration of diabetes logistic regression analysis of recurrence and metastasis as shown in Table 4. Renal carcinoma is the most common renal solid malignant tumor in clinic and clear cell carcinoma accounts for about 85 % of renal tumors[9]. The incidence of renal cancer ranks second in genitourinary tumors, second only to bladder cancer, accounting for 3 % of malignant tumors. In recent years, with the increasing awareness of resident's health and the popularization of malignant tumor knowledge, more and more patients with renal cancer have obtained the opportunity for early intervention. It can effectively improve the postoperative quality of life and prolong the survival time[10]. Although most patients can be diagnosed and treated at an early stage through the current diagnosis and treatment methods, and the 5 y survival rate after surgery has been significantly improved compared with the past, the operation itself is an invasive operation and it is also affected by factors such as the

patient's individual condition and age. Some patients still experience recurrence and metastasis after surgery, which affects the prognosis and quality of life[11]. Among 139 patients with renal cancer complicated with obesity, 31 patients had recurrence and metastasis within 3 y after operation and the incidence rate was 22.30 %[12]. A total of 221 renal cancer patients with type 2 diabetes mellitus were included in this study, of which 41 patients had recurrence and metastasis within 2 y after surgery and, the recurrence and metastasis rate was 18.55 %. The results were consistent with the above-mentioned research reports. It is suggested that the incidence of postoperative recurrence and metastasis of renal cancer is still at a good level and clinicians still need to pay more attention to these patients. As we all know, alcohol can cause great harm to the human body. Alcohol can affect the normal function of the digestive tract in the body and can also lead to liver detoxification dysfunction. When a large amount of active alcohol enters the liver, it can induce the symptoms of liver cirrhosis and excessive alcohol can stimulate the liver and promote liver abnormalities[13]. The amount of alcohol consumed is proportional to the capacity consumed by the liver. Excessive drinking can also increase the burden on the liver and induce lesions. In addition, alcohol can stimulate the cells in the body to produce oxygen free radicals, promote gene mutation, acetylation and histone methylation and then trigger the cancer response in the body[14]. Alcohol consumption can reduce the postoperative analgesic effect of tumor patients and affect the clinical efficacy of patients[15]. Studies have reported that alcohol consumption is an independent risk factor for postoperative survival in patients with renal cell carcinoma[16]. Smoking has now become one of the main risk factors threatening the incidence of Chinese population and it is the main cause of cardiovascular disease, cancer and other diseases and the death of patients with various diseases. The number of smokers in my country accounts for 30 % of the total number of smokers in the world, which makes the disease burden caused by smoking very serious; a survey study found that smoking ranks second among 87 causes of death, second only to high blood pressure[17]. Smoking was a risk factor for postoperative recurrence and metastasis. The reason for the recurrence of kidney cancer may be that the tar contained in cigarettes will also form nicotine after being ignited, which can be distributed to the whole body with the blood circulation of the body. Filtered through the kidneys and excreted through the urethra. However, the metabolic capacity of renal cancer patients is relatively poor and due to the influence of various invasive operations during the operation, the renal metabolic capacity of the patients cannot be metabolized normally, which leads to the accumulation of toxins and induces renal disease. It is suggested that the harmful substances in cigarettes may be involved in the occurrence and progression of kidney cancer. Insulin is mainly a peptide hormone produced by pancreatic Beta (β) cells and is also a regulator of fat metabolism and carbohydrates[18]. Insulin can increase the expression of Insulin-Like Growth Factor (IGF)-1 and IGF-1 can promote cell differentiation, proliferation and inhibit tumor cell apoptosis. Studies have found that the increased expression of IGF-1 and insulin also increases the secretion of Vascular Endothelial Growth Factor (VEGF), up regulates its expression level, induces tumor angiogenesis and promotes the recurrence, and metastasis of renal cancer. In addition, hyperglycemia can also promote the growth of tumor cells in the body and can induce the mutation of normal cells *in vivo* and promote the metastasis of tumor cells. With the prolongation of the course of diabetes, under the stimulation of hyperglycemia for a long time, the basement membrane of the body's capillaries can be thickened and the permeability of the body can be reduced, resulting in cell respiration disorders, enhanced anaerobic glycolysis and normal cells. In order to adapt to this state, malignant transformation gradually occurs. Long-term hyperglycemia can also induce the body to produce IGF-1, inflammatory factors, etc., and these factors can promote the growth of renal cancer cells. Prolonged duration of diabetes patients with reduced immunity, changes in hormone levels, body inflammation and high blood sugar provide a good growth environment for kidney cancer. It is suggested that a series of body changes caused by the course of diabetes may promote the occurrence of postoperative recurrence and metastasis of renal cancer. In conclusion, alcohol consumption, smoking and duration of diabetes in renal cancer patients with type 2 diabetes are positively correlated with postoperative recurrence and metastasis. Alcohol consumption, smoking and duration of diabetes may be involved in the occurrence and development of postoperative recurrence and metastasis. However, this study is a single-center, small-sample study and

the results may be biased. Therefore, the correlation analysis of alcohol consumption, smoking, duration of diabetes and postoperative recurrence and metastasis of renal cancer patients with type 2 diabetes still needs to be verified in future studies.

TABLE 1: COMPARISON OF GENERAL DATA OF PATIENTS

Project	Recurrence and metastasis group (n=41)	Non-recurrent metastatic group (n=221)	t/χ^2 value	p value
Age (years)	65.52±8.51	66.11±7.89	0.434	0.664
Gender (male/female)	26/15	134/87	0.113	0.737
Education level (below junior high school/ junior high school and above)	27/14	156/65	0.368	0.544
BMI (kg/m^2)	24.14±2.57	24.23±2.28	0.227	0.82
Residence (urban/rural)	23/18	107/114	0.816	0.366
Hypertension (yes/no)	13/28	82/129	0.436	0.509
Coronary heart disease (yes/no)	7/34	35/186	0.039	0.843
Clinical symptoms (yes/no)	22/19	93/128	1.882	0.17
Tumor side (left kidney/right kidney)	20/21	108/113	0.000	0.992
Family history of cancer (yes/no)	14277	8/213	0.149	0.699
Pathological type (clear cell carcinoma/ papillary cell carcinoma/other)	32/2/7	194/7/20	2.835	0.242
Fuhrman classification (I~II/III~IV grades)	15/26	117/104	3.701	0.054

TABLE 2: COMPARISON OF THE PROPORTION OF ALCOHOL CONSUMPTION, SMOKING AND DIABETES DURATION

Project	Recurrence and metastasis group (n=41)	Non-recurrent metastatic group (n=221)	t/χ^2 value	p value
Drinking alcohol (yes/no)	24/17	82/139	6.595	0.010
Smoking (yes/no)	27/14	98/123	6.414	0.011
Duration of diabetes (≥5/<5 y)	29/12	108/113	6.626	0.010

TABLE 3: CORRELATION OF DRINKING, SMOKING, DURATION OF DIABETES AND POSTOPERATIVE RECURRENCE, AND METASTASIS IN PATIENTS WITH RENAL CANCER COMPLICATED WITH TYPE 2 DIABETES

Variable	Ischemic cardiomyopathy	
	r	p
Drinking	0.631	0.000
Smoking	0.640	0.000
Diabetes course	0.593	0.000

TABLE 4: ANALYSIS OF INFLUENCING FACTORS OF POSTOPERATIVE RECURRENCE AND METASTASIS

Variable	Regression coefficient	Standard error	Wald χ^2 value	p value	OR value	95 % CI for OR values
Drinking	0.877	0.36	5.941	0.015	2.403	1.187~4.862
Smoking	0.958	0.372	6.644	0.010	2.608	1.258~5.404
Diabetes course	1.136	0.387	8.635	0.003	3.115	1.46~6.645
Constant	-3.32	0.469	50.06	0.000	0.036	-

Conflict of interests:

The authors declared no conflict of interests.

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