Chronic kidney failure frequency and associated factors in kidney cancer patients having undergone nephrectomy


ABSTRACT

Introduction: For many years radical nephrectomy has been the treatment of choice in kidney tumor management. Currently nephron-sparing surgery in T1 tumors is the indicated therapy. Patients with kidney cancer are at risk for developing chronic kidney failure after surgical treatment when presenting with risk factors such as diabetes, high blood pressure, obesity, and smoking.

Objective: To determine the presence of chronic kidney failure and associated factors involved in its development in patients having undergone partial or radical nephrectomy due to kidney cancer.

Methods: The variables of sex, body mass index, diabetes mellitus, high blood pressure, smoking, and preoperative and postoperative kidney function were analyzed in fifty-two patients having undergone partial or radical nephrectomy over a five-year period. Patients with preoperative kidney damage were excluded.

Results: Forty-seven patients fit the inclusion criteria, forty-three underwent radical nephrectomy, four

RESUMEN

Introducción: Por muchos años, la nefrectomía radical ha sido el tratamiento de elección en el manejo de los tumores renales. Actualmente, la cirugía preservadora de nefronas en tumores T1, es la terapia indicada. Los pacientes con cáncer renal se encuentran en riesgo de desarrollar enfermedad renal crónica, posterior al tratamiento quirúrgico, puesto que algunos presentan factores de riesgo como diabetes mellitus (DM), hipertensión arterial sistémica (HAS), obesidad y tabaquismo.

Objetivo: Determinar la presencia de insuficiencia renal crónica y los factores asociados, que se encuentran involucrados en el desarrollo de la misma, en pacientes sometidos a nefrectomía parcial o radical por cáncer renal.

Materiales y métodos: Cincuenta y dos pacientes sometidos a nefrectomía radical o parcial, fueron analizados en cinco años, determinado la función renal pre y posoperatoria, sexo, índice de masa corporal (IMC), DM, HAS y tabaquismo. Se excluyeron los pacientes con daño renal preoperatorio.
underwent partial nephrectomy, eleven presented with diabetes mellitus, twenty-five presented with high blood pressure, and nineteen patients were smokers. Of the radical nephrectomy patients, eleven (23%) developed chronic kidney damage. No patient having undergone partial nephrectomy developed kidney damage.

Conclusions: Patients undergoing partial or radical nephrectomy are at greater risk for developing chronic kidney damage, regardless of other risk factors.

Keywords: Kidney cancer, nephrectomy, chronic kidney failure, Mexico.

INTRODUCTION

For many years, radical nephrectomy was considered to be the treatment of choice in renal cortical tumors. Advances in imaging studies have increased asymptomatic kidney tumor detection by up to 73%.1 Currently, 50% of patients with surgically resectable tumors present with no symptoms.2 Partial nephrectomy, when possible, is recommended in patients with T1 kidney tumors. Different groups have attempted to describe the consequences on renal function in patients that have undergone nephrectomy. The objective of partial nephrectomy is to control kidney cancer and spare kidney tissue in order to reduce possible kidney function deterioration.3

Previous studies have shown an increase in kidney failure, defined as serum creatinine concentration greater than 2 mg/dL, in patients that underwent radical nephrectomy when compared with patients having undergone partial nephrectomy.4 These studies are limited due to the fact that serum creatinine measurement is inadequate for determining kidney function because there is a clinically relevant reduction in kidney function with serum creatinine concentration < 2 mg/dL.

Long-term follow-up of patients undergoing nephrectomy in kidney transplantation shows that normal kidney function can be maintained with a solitary kidney. However, kidney transplantation patients are significantly different from kidney cancer patients because they are selected in order to minimize comorbidities such as high blood pressure, diabetes mellitus, and smoking (factors known to increase risk of kidney failure).5

Current guidelines define chronic kidney disease as estimated glomerular filtration rate (eGFR) < 60 mL/min/1.73 m².6 Experimental studies have shown that when there is a reduction in kidney mass reduction, hyperfiltration develops to avoid a drop in glomerular filtration (preglomerular vasodilation, increase in plasma flow by the nephron, and increase in glomerular intracapillary pressure).7

The principal consequences of kidney disease are: loss of kidney function leading to kidney failure,8 that can cause diseases such as high blood pressure, anemia, malnutrition, and reduced quality of life, as well as increased risk for cardiovascular disease and greater mortality.9,10 Data from large series have shown in long-term follow-up that there is increased risk for developing chronic kidney failure in patients that have undergone radical nephrectomy when compared with patients having undergone partial nephrectomy.11

The objective of the present study was to determine the presence of kidney failure in kidney cancer patients treated with nephrectomy and to identify factors associated with the development of chronic kidney failure in those patients.
METHODS

An observational, retrospective study was carried out on kidney cancer patients that underwent radical or partial nephrectomy as treatment within the time frame of January 1, 2006 to December 31, 2010 at the Hospital General Dr. Manuel Gea González. Baseline kidney function was determined by calculating preoperative estimated glomerular filtration rate (eGFR) using the Modification of Diet in Renal Disease Study (MDRDS) equation (186 x serum creatinine in mg/dL x 1.154 x age in years x 0.203 [x 0.742 if female]) and then determining it again 90 days after surgery. Chronic kidney disease was designated as a value under 60 mL/min/1.73 m², as established by the National Kidney Foundation/Kidney Disease Outcomes Quality Initiative (KDOQI) that classifies chronic kidney failure in 5 stages:

- Stage I: 90 mL/min/1.73 m²
- Stage II: 60-89 mL/min/1.73 m²
- Stage III: 30-59 mL/min/1.73 m²
- Stage IV: 15-29 mL/min/1.73 m²
- Stage V: <15 mL/min/1.73 m²

Those patients that presented with eGFR <60 mL/min/1.73 m² prior to surgical treatment were excluded from the study. Multivariate Cox regression was carried out to determine whether variables such as sex, high blood pressure (HBP), diabetes mellitus (DM), smoking, or body mass index (BMI) were risk factors for developing chronic kidney failure.

The Windows Stata/SE Ver 9.1, StataCorp LP software package was used to make statistical calculations. The study was accepted by the Ethics Committee of the Hospital General Dr. Manuel Gea González.

RESULTS

Fifty-two patients underwent partial or radical nephrectomy within the time frame of January 1, 2006 to December 31, 2010. Five of those 52 patients had...
preoperative eGFR <60 mL/min/1.73m² and were excluded from the study. Of the remaining 47 patients (Table 1), 29 (61%) were men and 18 (39%) were women. Four patients (8.5%) underwent partial nephrectomy and 43 underwent radical nephrectomy. Eleven patients (23%) presented with DM, 25 (53%) had HBP, and 19 (40%) patients were smokers. Eight patients were obese (BMI ≥ 30). After surgical treatment, 11 patients (23.4%) (Table 2), presented with kidney function deterioration under 60 mL/min/1.73m². Of those patients 6 were men and 5 were women. Two patients were obese (BMI>30), 6 patients had HBP, 3 presented with DM, and 5 were smokers; only 1 patient was stage V and required peritoneal dialysis. None of the patients that underwent partial nephrectomy presented with kidney function deterioration.

In the statistical analysis, radical nephrectomy had a hazard ratio (HR) of 1 with 95% confidence interval (CI) of 0.336-2.8275. No factors related to chronic kidney failure development were statistically significant in this study when age, sex, BMI, DM, HBP, smoking, and partial or radical nephrectomy were evaluated using multivariate Cox regression analysis (Table 3).

**DISCUSSION**

Of the patients analyzed, 23% presented with kidney function deterioration, which concurs with reports of large international series. None of the patients that underwent partial nephrectomy presented with postoperative kidney function deterioration. In accordance with Sorbellini et al.,11 this is an expected result given that they showed radical nephrectomy to be an independent risk factor for developing chronic kidney failure.12 Huang et al. also demonstrated this when they found chronic kidney damage in 26% of patients.4 Those patients with preoperative eGFR >60 mL/min/1.73m² had significant eGFR reduction after radical nephrectomy.

Chronic kidney damage was observed more frequently in patients with HBP. However, HR of 1 with 95% CI of 0.5197-1.9238 was not statistically significant, as reported by Klarenbach et al.13

In the present study, 22 patients (44%) were older than 50 years of age. Seven of them developed chronic kidney damage, coinciding with that reported by Jeon et al.14 They found greater presence of chronic kidney damage in patients as both age and postoperative time lapse increased.

Currently partial nephrectomy has been shown to have the same effectiveness as radical nephrectomy in relation to oncologic control of T1 kidney tumors. In addition is has the advantage of sparing functional kidney tissue.

Statistically significant differences were not found in the present study due to sample size.

**CONCLUSIONS**

The present study showed that patients undergoing radical nephrectomy for kidney cancer have an elevated rate of chronic kidney failure. Therefore it is necessary to take into consideration existing comorbidities prior to surgical treatment and to treat them postoperatively, so that chronic kidney failure does not develop. When possible, partial nephrectomy is the indicated treatment for T1 tumors.
REFERENCES