



## ORIGINAL ARTICLE

# Obesity, hypertension and diabetes mellitus affect complication rate of different nephrectomy techniques<sup>☆</sup>



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### KEYWORDS

Complication;  
Diabetes mellitus;  
Hypertension;  
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Obesity

### Abstract

**Introduction:** To investigate whether obesity, hypertension, and diabetes mellitus (DM) would increase post-nephrectomy complication rates using standardized classification method.

**Methods:** We retrospectively included 843 patients from March 2006 to November 2012, of whom 613 underwent radical nephrectomy (RN) and 229 had partial nephrectomy (PN). Modified Clavien classification system was applied to quantify complication severity of nephrectomy. Fisher's exact or chi-square test was used to assess the relationship between complication rates and obesity, hypertension, as well as DM.

**Results:** The prevalence of obesity, hypertension, and DM was 11.51%, 30.84%, 8.78%, respectively. The overall complication rate was 19.31%, 30.04%, 35.71% and 36.36% for laparoscopic radical nephrectomy (LRN), open-RN, LPN and open-PN respectively. An increasing trend of low grade complication rate as BMI increased was observed in LRN ( $P = .027$ ) and open-RN ( $P < .001$ ). Obese patients had greater chance to have low grade complications in LRN (OR = 4.471; 95% CI: 1.290–17.422;  $P = 0.031$ ) and open-RN (OR = 2.448; 95% CI: 1.703–3.518;  $P < .001$ ). Patients with hypertension were more likely to have low grade complications, especially grade II complications in open-RN (OR = 1.526; 95% CI: 1.055–2.206;  $P = .026$ ) and open PN (OR = 2.032; 95% CI: 1.199–3.443;  $P = .009$ ). DM was also associated with higher grade I complication rate in open-RN (OR = 2.490; 95% CI: 331–4.657;  $P = .016$ ) and open-PN (OR = 4.425; 95% CI: 1.815–10.791;  $P = .013$ ). High grade complication rates were similar in comparison.

**Conclusions:** Obesity, hypertension, and DM were closely associated with increased post-nephrectomy complication rates, mainly low grade complications.

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**PALABRAS CLAVE**

Complicación;  
Diabetes mellitus;  
Hipertensión;  
Nefrectomía;  
Obesidad

## La obesidad, la hipertensión y la diabetes mellitus afectan la tasa de complicaciones de las diferentes técnicas de nefrectomía

### Resumen

**Introducción:** Nuestro objetivo es investigar si la obesidad, la hipertensión y la diabetes mellitus (DM) aumentan la tasa de complicaciones tras nefrectomía empleando métodos de clasificación estandarizados.

**Métodos:** Incluimos retrospectivamente 843 pacientes desde marzo de 2006 hasta noviembre de 2012, 613 de los cuales fueron sometidos a nefrectomía radical (NR) y 229 a nefrectomía parcial (NP). Se empleó el sistema de clasificación de Clavien modificado para cuantificar la gravedad de las complicaciones de la nefrectomía. Para evaluar la relación entre las tasas de complicaciones y la obesidad, la hipertensión, así como la DM, se emplearon el test exacto de Fisher y la prueba de Chi cuadrado.

**Resultados:** La prevalencia de la obesidad, la hipertensión y la DM fue del 11,51, 30,84 y 8,78%, respectivamente. La tasa global de complicaciones fue del 19,31, 30,04, 35,71 y 36,36% para la NR laparoscópica (NRL), la NR abierta, NPL y NP abierta respectivamente. Se observó una tendencia creciente en la tasa de complicaciones leves al aumentar el IMC en la NRL ( $p=0,027$ ) y en la NR abierta ( $p<0,001$ ). Los pacientes obesos tenían más probabilidades de sufrir complicaciones leves en la NRL (OR = 4,471; IC 95%: 1,290–17,442;  $p=0,031$ ) y en la NR abierta (OR = 2,448; IC 95%: 1,703–3,518;  $p<0,001$ ). Los pacientes con hipertensión eran más propensos a sufrir complicaciones leves, especialmente complicaciones de grado II en una NR abierta (OR = 1,526; IC 95%: 1,055–2,206;  $p=0,026$ ) y en una NP abierta (OR = 2,032; IC 95%: 1,199–3,443;  $p=0,009$ ). La DM también se asoció con una mayor tasa de complicaciones de grado I en la NR abierta (OR = 2,490; IC 95%: 331–4,657;  $p=0,016$ ) y en la NP abierta (OR = 4,425; IC 95%: 1,815–10,791;  $p=0,013$ ). En comparación, las tasas de complicaciones severas fueron similares.

**Conclusiones:** La obesidad, la hipertensión y la DM están estrechamente relacionadas con unas tasas más elevadas de complicaciones, principalmente leves, tras nefrectomía.

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## Introduction

Short-term postoperative outcomes of surgical procedures are generally applied to assess the quality of care offered to the patient. Kidney tumors are one of the most commonly diagnosed types of cancer. In 2012 the estimated number of new cases of renal tumors in the USA was 64,770, thus ranking eighth among all tumors.<sup>1</sup> In Spain, a rapid upward trend in the incidence, mortality and prevalence of kidney cancer has also been observed in the last ten years.<sup>2</sup> Over the last few decades, new surgical techniques have been applied for the treatment of renal tumors, such as partial nephrectomy (PN) and laparoscopic surgery. Previous studies have shown that PN can provide equivalent oncologic control as for radical nephrectomy (RN) in renal tumors less than 4 cm in diameter, with the benefit of preserving renal function.<sup>3–5</sup> Laparoscopic RN (LRN) and laparoscopic PN (LPN) have emerged as minimally invasive alternatives to open surgery, with shorter recovery periods, a shorter postoperative hospital stay and a shorter convalescence time.<sup>6</sup>

Given the westernization of lifestyles and eating habits, both the prevalence of metabolic disorders, as well as hypertension, diabetes mellitus (DM) and obesity are increasing in China and have become a major public health problem.<sup>7–9</sup> Previous studies have provided inconsistent results as to whether hypertension, DM and obesity might increase the postoperative complication rate of nephrectomy.<sup>10,11</sup> The

Clavien classification system has been proposed in order to determine the complications of surgery.<sup>12</sup> This system has recently been modified and prospectively validated in a large group of patients.<sup>13</sup> We conducted this study with the aim of assessing whether hypertension, diabetes and obesity increase the risk for complications after RN or PN.

## Materials and methods

### Patient source

After obtaining approval of the Institutional Review Board of Huashan Hospital, Fudan University, Shanghai, China, a retrospective study of medical records from March 2006 to November 2012 was performed to identify all patients who had undergone RN or PN for presumed renal tumor. Patients were excluded from the study in case their BMI, their medical records regarding hypertension or DM, or the pathological–surgical or postoperative information were not available. We identified a total of 843 patients, 613 of whom had undergone RN (88 had LRN, 526 had open RN) and 229 had undergone PN (42 had LPN, 187 had open PN). Written consent was given by the patients for their information to be stored in the hospital database and used for research. Both LRN and LPN were performed via the transperitoneal approach in the modified lateral decubitus position.

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