

Rhabdomyolysis after Retroperitoneal Laparoscopic Radical Nephrectomy in the Lateral Decubitus Position

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Postoperative rhabdomyolysis is a rare but potentially fatal surgical complication. We experienced a case of rhabdomyolysis after laparoscopic radical nephrectomy (LRN). Right renal carcinoma was diagnosed in a 31-year-old woman with a body mass index of 28.5 kg/m². She underwent right retroperitoneal LRN in the lateral decubitus position. The operating time was approximately 5 hours. Immediately after surgery, she reported pain in the left buttock, and reddish discoloration of the urine was observed. On the basis of these symptoms, an elevated serum creatine kinase level, and computed tomography findings, we diagnosed rhabdomyolysis of the left gluteal muscle secondary to its intraoperative compression caused by prolonged placement in a fixed position. She was treated with hydration therapy and discharged 6 days postoperatively. Prolonged surgery, obesity, and placement in the lateral decubitus position are risk factors for postoperative rhabdomyolysis. Surgeons should attempt to reduce operating time for LRN when obese patients are placed in the lateral decubitus position.

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Key words: rhabdomyolysis, laparoscopic radical nephrectomy, retroperitoneal approach, lateral decubitus position

Introduction

Rhabdomyolysis is a rare, potentially fatal clinical syndrome due to acute muscle fiber necrosis with leakage of muscle constituents into blood and extracellular tissue¹. It can be caused by inherited diseases, toxins, muscle compression or overexertion, and inflammatory processes¹. Symptoms include pain, tenderness, edema, and weakness of muscles. Rhabdomyolysis is generally diagnosed by elevated serum creatine kinase (CK) levels and the presence of myoglobinuria. Dialysis-requiring acute renal failure (ARF) occurs in some patients². Rhabdomyolysis can also occur after muscle compression during surgery. Postoperative rhabdomyolysis has been reported as a rare complication of some procedures, including bariatric, cardiovascular, spinal, and urologic surgery^{3–6}. A previous large cohort study revealed that, in urologic surgery, the

frequency of postoperative rhabdomyolysis was 0.17% after cystectomy, 0.15% after nephrectomy, and 0.04% after prostatectomy⁶.

We report a case of rhabdomyolysis of the left gluteal muscle after retroperitoneal laparoscopic radical nephrectomy (LRN) in the lateral decubitus position.

Case Presentation

A 31-year-old woman (weight 67 kg; height 153 cm; body mass index [BMI] 28.5 kg/m²) was diagnosed with right renal carcinoma (cT2aN0M0). The diameter of the tumor on its major axis was 8 cm (**Fig. 1**). Her medical history was unremarkable. Preoperative laboratory values were mostly within normal ranges. She underwent right retroperitoneal LRN while in the lateral decubitus position. Adhesions between the peritoneum and tumor

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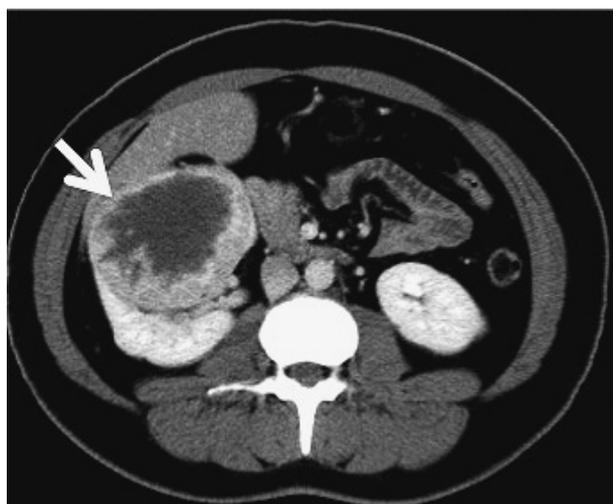


Fig. 1 Preoperative abdominal computed tomography
The white arrow shows the right renal tumor.



Fig. 2 Pelvic computed tomography immediately after the operation
The white arrow shows a large low-density area in the left gluteal muscle.

Table 1 Laboratory results for the patient

	Preoperatively	POD 0	POD 1	POD 2	POD 4	POD 5	POD 30
LDH (Normal 115-245 IU/L)	148	418	787	964	834	661	138
CK (45-163 IU/L)	84	12,385	33,262	29,986	9,314	3,580	88
Cre (<0.70 mg/dL)	0.55	1.05	0.93	0.79	0.82	0.89	0.8
Urine volume (mL/day)	N.A.	1,930	1,729	3,417	2,200	N.A.	N.A.

POD: postoperative day, LDH: lactate dehydrogenase, CK: creatine kinase, Cre: creatinine, N.A.: Not available

made the operation difficult. The surgery was performed in 294 minutes, without major intraoperative complications. The patient was in the lateral decubitus position for 335 min. Intraoperative blood loss was minimal. Immediately after surgery, she reported moderate pain in the left buttock, which had been compressed during the surgery, and reddish discoloration of her urine was observed. At this time, her serum CK level was elevated (12,385 IU/L; normal range for females 32-180 IU/L), and serum creatinine was 1.01 mg/dL. Computed tomography revealed a large low-density area in the left gluteal muscle (**Fig. 2**). We diagnosed rhabdomyolysis of the left gluteal muscle due to compression during surgery in a fixed position. She was treated conservatively with hydration therapy. Daily urine volume was maintained between 1,729 and 3,417 mL. Her serum CK level progressively decreased from postoperative day (POD) 2 (**Table 1**), buttock pain decreased from POD 4, and she was discharged on POD 6.

Discussion

Reported risk factors for postoperative rhabdomyolysis after laparoscopic nephrectomy include male gender,

high BMI, prolonged surgery, and placement in the lateral decubitus position⁷. In the present case, a patient with a high BMI underwent LRN in the lateral decubitus position, and the procedure was approximately 5 h. The patient remained in the lateral decubitus position for 335 min and the duration of surgery was 294 min. Hence, for 41 min she was in the lateral decubitus position while not undergoing surgery. It is possible to shorten this interval.

The symptoms of rhabdomyolysis are pain, tenderness, edema, and muscle weakness⁸. Rhabdomyolysis is usually diagnosed on the basis of elevated serum CK levels and the presence of myoglobinuria. However, there are no clear criteria for the diagnosis of rhabdomyolysis. In the present case, we immediately noticed the onset of rhabdomyolysis, because a blood test including serum CK level was performed immediately after the operation, at the request of the attending physician. For patients at high risk of postoperative rhabdomyolysis, measurement of serum CK level on the day after surgery is useful. After this experience, we now routinely measure serum CK levels on the day after surgery in obese patients undergoing laparoscopic renal surgery in the lateral decubitus

position, when the operation time is longer than 3 h. Serum CK level reflects muscle damage and is the most sensitive and useful parameter for monitoring patients with rhabdomyolysis^{1,9}. In our case, change in serum CK level was proportional to changes in symptoms.

ARF occurs in 15-46% of patients with rhabdomyolysis, and death occurs in 3.4% of patients⁹. The mechanism of rhabdomyolysis-induced ARF is not completely understood, although it is thought to involve complex mechanisms that include myoglobin-induced vasoconstriction, heme molecule cytotoxicity, and obstruction of renal tubules with myoglobin in the presence of aciduria¹⁰. Treatment of rhabdomyolysis includes aggressive fluid resuscitation with central venous pressure monitoring, use of mannitol, and infusion of sodium bicarbonate to alkalinize the urine, to stop progression of renal failure¹. Serum creatinine levels greater than 1.5 mg/dL, a base deficit of less than -4 mEq/L, a serum CK level greater than 5,000 U/L, and the presence of myoglobinuria are risk factors for development of dialysis-requiring ARF after an episode of rhabdomyolysis⁹. In our patient, serum CK level was much higher than 5,000 IU/L. However, her urine volume was maintained and serum creatinine level was relatively well maintained. Therefore, she was treated without hemodialysis. In postoperative rhabdomyolysis, it is important to closely monitor urine volume, as well as serum creatinine and CK levels. If signs and symptoms suggest worsening kidney function, hemodialysis should be started without delay.

At our center, we prefer to use the retroperitoneal approach for LRN, to avoid complications related to intra-abdominal organs¹⁰. Our experience with this patient indicates that, when the patient is obese, surgeons should attempt to limit operating time when performing retroperitoneal LRN with the patient in lateral decubitus position.

Conclusions

Postoperative rhabdomyolysis is a rare but potentially fatal surgical complication. Surgeons must therefore be familiar with diagnosis and treatment of postoperative rhabdomyolysis.

When performing LRN on an obese patient in the lat-

eral decubitus position, surgeons should strive to limit operating time. When operating time is longer than 3 h, serum CK level should be measured on the day after surgery.

Conflict of Interest: None declared.

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