



Rhabdomyolysis after a Prolonged Laparo-Endoscopic Single-Site Supracervical Hysterectomy Surgery: A Case Report

Yu-Chieh Fang¹, S. Joseph Huang^{1,3}, Chi-Chang Chang^{2,3,}*

Rhabdomyolysis is an unusual but possibly life-threatening medical condition that results from acute muscle necrosis with secretion of muscle components into plasma. This critical disease could be due to muscle compression caused by dorsolithotomy position for a prolonged operation time in gynecological surgery. In this regard, extended laparoscopic hysterectomy surgery may be a risk for the development of rhabdomyolysis. Moreover, rhabdomyolysis can produce acute kidney injury, hepatic injury, hypovolemia, hyperkalemia, hyperphosphatemia, hypocalcemia, hyperuricemia, and metabolic acidosis. In this article, we presented a case who developed rhabdomyolysis under the dorsolithotomy position after a prolonged period of extended laparo-endoscopic single-site (LESS) supracervical hysterectomy surgery.

Key words: rhabdomyolysis, laparo-endoscopic single-site supracervical hysterectomy surgery, dorsolithotomy position

Introduction

Uterine leiomyomas constitute the most common type of pelvic tumor in women.¹ Such tumors generally occur in women of reproductive age and produce symptoms of abnormal uterine bleeding or pelvic pain. The major concerns of patients with symptomatic leiomyoma include social relationships, employment, and overall health. Uterine leiomyomas are costly to the healthcare system and each individual patient. Uterine leiomyoma

consists of 40 percent of hysterectomy. Therapeutic costs are usually attributed to surgical costs and income loss due to sick leave.²

Hysterectomy is the most common gynecologic surgery which can be completed via transabdominal, transvaginal or laparoscopic route. Minimally invasive surgery using laparoscope has benefits of favorable cosmesis, shorter hospital stay, faster recovery, reduced blood loss, reduced wound-associated complications, such as infection, hematoma and dehiscence, and reduction in postoperative complications as deep vein thrombosis.³

From the ¹Department of Obstetrics and Gynecology, E-Da Hospital, I-Shou University; ²Department of Obstetrics and Gynecology, E-Da Dachang Hospital, I-Shou University; ³School of Medicine, College of Medicine, I-Shou University, Kaohsiung, Taiwan.

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* Address reprint request and correspondence to: Chi-Chang Chang, Department of Obstetrics and Gynecology, E-Da Dachang Hospital, No. 305, Dachang 1st Road, Sanmin District, Kaohsiung City 807066, Taiwan
Tel: +886-7-615-0011 ext. 252900, E-mail: ujinks@hotmail.com

Several modifications, such as laparoscopy-assisted vaginal hysterectomy, laparoscopic assisted supracervical hysterectomy,⁴ total laparoscopic hysterectomy,⁵ mini-laparoscopy, laparo-endoscopic single-site (LESS), and natural orifice transluminal endoscopic surgery, have been described with increasing application since the first laparoscopic hysterectomy in January, 1989.⁶

Rhabdomyolysis after a hysterectomy is an unusual but potentially severe and devastating condition. Rhabdomyolysis is a possibly fatal syndrome that leads to necrosis and lysis of muscle cells and release of intracellular substances into plasma and urine. The syndrome is associated with significantly elevated creatinine kinase (CK) levels, hyperkalemia, hyperphosphatemia, myoglobinuria, hyperuricemia, cardiac arrhythmias, metabolic acidosis, compartment syndrome, and renal failure. Up to 46% of cases with rhabdomyolysis will be complicated with renal failure.⁷ Though uncommon, rhabdomyolysis commonly complicates laparoscopic urological surgery and bariatric procedures because of prolonged surgical position that causes muscle compression with resulting ischemia and reperfusion injury.⁸

Early diagnosis and treatment of this condition are important as laparoscopic hysterectomy is becoming a common procedure for women.

Case Report

A 49-year-old G0P0 female, who had laparotomy myomectomy when she was 30 and 36 years old, visited our outpatient clinic because of recurrent menorrhagia accompanied with anemia and a palpable abdominal mass. Gynecologic ultrasound showed a uterine myoma up to 22 cm in diameter. Elevated carbohydrate antigen 125 (CA125) at 204 U/mL was detected. Abdominal computed tomography revealed multiple nodular masses, suspect-

ed uterine myomas, in the uterus. Therefore, LESS hysterectomy was performed.

During operation, the patient was placed in the dorsolithotomy position. Open entry of Hasson technique was used to open abdominal wall through umbilicus and set the port. Severe adhesion below the umbilicus and among uterus, colons, small intestines, bilateral pelvic side wall was found. Cul-de-sac was totally obliterated. Therefore, enterolysis with bowel decompression surgery was performed in the first 3.5 hours. Then, an enlarged uterus with multiple myomas about 24-week pregnancy in size was observed. The uterus was removed from the umbilicus by LESS supracervical hysterectomy with manual morcellation. A perforation about 4 cm in sigmoid colon was identified during the operation. The perforation was repaired with 2 layers of V-loc. These procedures took additional 5 hours. Hence, the total operative time was 8 hours 30 minutes with blood loss and urine output of 650 mL and 1,320 mL, respectively. A total of 4,950 mL of crystalloid solution and 250 mL of colloid solution were given. The endotracheal tube was removed after reversing muscle relaxation and confirming the patient's spontaneous breathing.

The patient complained of pain in bilateral lower legs at post-anesthetic care unit. Swollen feet extending to the calf without redness and warmth was observed. Symmetric positive dorsal pedis pulse were detected. Patient-controlled analgesia was administered was used to treat the post-operative leg pain without relief of the pain. On post-operative day (POD) 1, dark urine with reduced urine output at 25 mL/hour was noted. Laboratory tests revealed glutamic oxaloacetic transaminase/glutamic pyruvic transaminase level of 1,022/285 IU/L, blood urea nitrogen/creatinine at 6.9/0.48 mg/dL, CK at 34,724 IU/L, and myoglobin at 4,065.9 ng/mL. An arterial blood gas analysis with spontaneous breath under room air showed a pH of 7.41, PaCO₂

of 40 mmHg, PaO₂ of 98 mmHg, and HCO₃⁻ of 25.4 mmol/L. Complete duplex ultrasound and computed tomography angiography of lower extremity showed no evidence of deep vein thrombosis. However, severe edema in the posterior muscular compartment of bilateral lower legs with the absence of venous drainage was detected (Fig. 1). Although the patient had stable vital signs, she was sent to intensive care unit (ICU) under the impression of rhabdomyolysis.

After admission to ICU, she was conservatively treated with hydration therapy. Daily urine output was maintained between 4,415 and 7,450 mL during the first few days. Her serum CK levels progressively decreased from POD 2 and bilateral lower legs pain gradually subsided from POD 4. The patient was discharged under stable conditions on POD 15 (Fig. 2).

Discussion

Rhabdomyolysis is a syndrome illustrated by muscle necrosis and the release of intra-

cellular elements into the circulation. When this occurs, CK levels are usually elevated, and muscle pain and myoglobinuria may be

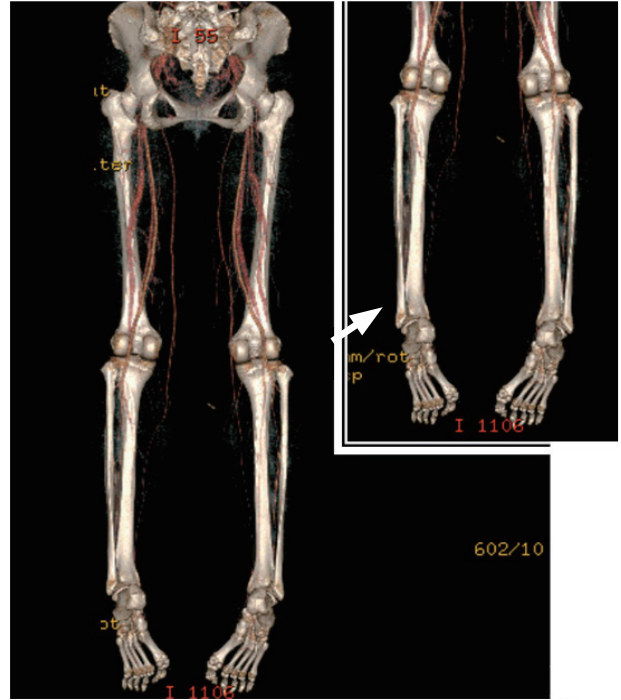


Fig. 1 Computed tomography angiography of lower extremities. No evidence of deep vein thrombosis. But severe edema in the posterior muscular compartment of bilateral lower legs with the absence of venous drainage was detected.

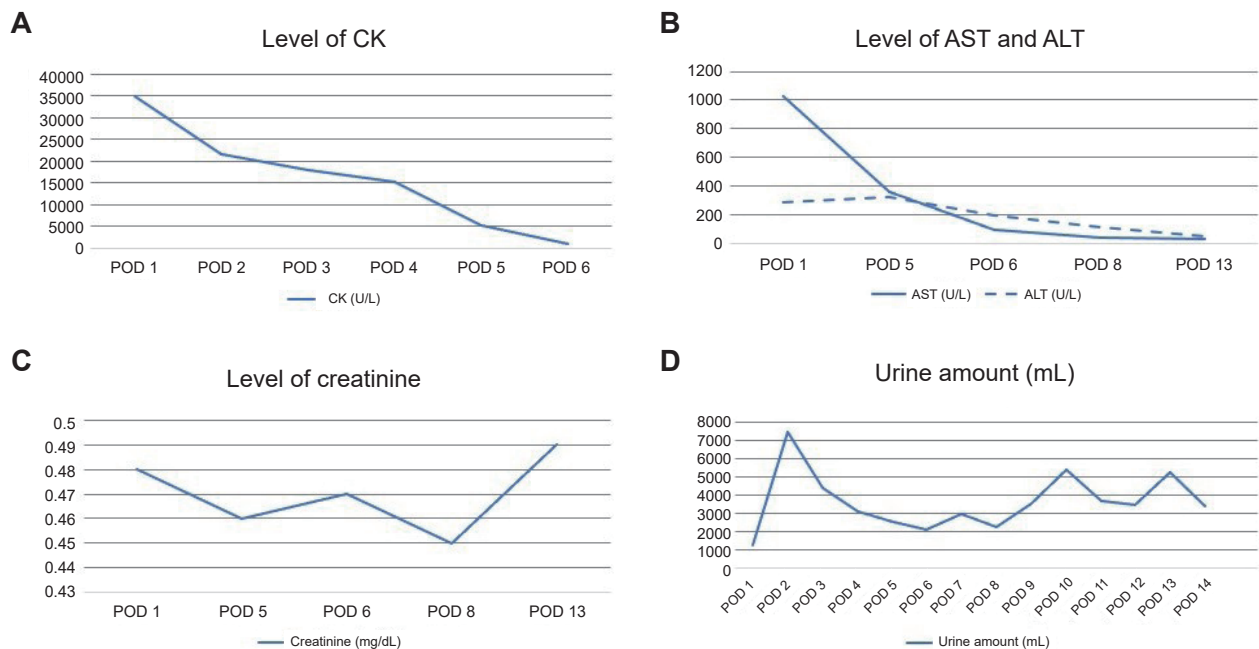


Fig. 2 Serial data of creatinine kinase (CK), Creatinine, urine amount, aspartate aminotransferase (AST) and alanine aminotransferase (ALT). (A) The serum CK levels progressively decreased from post-operative day (POD) 2. (B) The liver function was significantly improved from POD 5. (C) The renal function was not deteriorated after operation. (D) The urine amount was increased after treatments for rhabdomyolysis.

detected. Complications include acute renal failure, hepatic injury, hypovolemia, hyperkalemia, hyperphosphatemia, hypocalcemia, hyperuricemia, and metabolic acidosis. Hyperkalemia could result in cardiac dysrhythmias. Rhabdomyolysis is mainly reported in urological and bariatric surgeries. The association of rhabdomyolysis and gynecologic surgery was barely reported. Thus, the role of gender-dependent difference in the occurrence of rhabdomyolysis needs to be scrutinized.

The most common causes associated with rhabdomyolysis include trauma, immobilization, sepsis, and cardiovascular surgeries. In addition, overexertion and such drugs as lipid-lowering agents, alcohol, and cocaine can also lead to rhabdomyolysis (Table. 1). The majority of patients are affected by more than one etiologic factor, while no identifiable cause can be found in less than 10% of patients. The current case underwent extended surgery in a dorsolithotomy position for a prolonged period of time.

The characteristic triad of complaints in rhabdomyolysis includes muscle pain, weakness, and dark urine. For patients without all 3 symptoms, an acute elevated CK level can be a useful reference in diagnosing rhabdomyolysis. The CK levels typically elevate to greater than 5,000 IU/L which is at least five times higher than the upper limit of normal value.

Rhabdomyolysis treatment involves aggressive fluid resuscitation with central

venous pressure examining, and urine alkalization by infusing sodium bicarbonate to slow down the progression of renal failure. Hemodialysis is important in recovering renal function. The high recurrence rate at 11% mandates the requirement of special attention by anesthesiologists if repeated surgery is inevitable.

Clinically, rhabdomyolysis is hard to predict and prevent for patients without significant past histories or underlying disease in gynecological surgeries. For our case, immobilization with prolonged operation time was the cause of rhabdomyolysis. Therefore, before the operation, maybe we can discuss with the patient and arrange multi-step surgeries to shorten the operation time. Besides, during the operation, there are ways to prevent rhabdomyolysis: 1) warranting correct patient positioning every 2 hours; 2) using intermittent pneumatic compression pumps for the lower legs; 3) offering shoulder padding.

Gynecologists must always consider the potential risk of rhabdomyolysis, a severe and life-threatening complication, in patients placed in the dorsolithotomy position for a prolonged period during extended surgery. Prevention, early detection, and immediate therapeutic measures are essential in dealing with rhabdomyolysis caused by prolonged surgery.

Author Contributions

Yu-Chieh Fang did the literature serch,

Table 1. Causes of rhabdomyolysis.

Traumatic or compression		Current patient
Trauma or crush injuries		-
Cardiovascular surgeries		-
Coma		-
Immobilization or prolonged surgical intervention		+
Non-traumatic		
Exertional	Extreme exertion, environmental heat illness, sickle cell trait, seizures, metabolic myopathies, malignant hyperthermia	-
Non-exertional	Alcoholism, drugs and toxins (e.g., lipid-lowering agents, cocaine), infections (e.g., human immunodeficiency virus), electrolyte abnormality	-

collected the medical history, interpreted the data and prepared the manuscript. Chi-Chang Chang and S. Joseph Huang edited the manuscript. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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