

# Chronic Renal Failure in a Patient Due to Gluteal Compartment Syndrome After a Nephrectomy Operation

## *Nefrektomi Operasyonu Geçiren Hastada Gluteal Kompartman Sendromuna Bağlı Kronik Böbrek Yetmezliği*

### ABSTRACT

Gluteal compartment syndrome is a rare reason of rhabdomyolysis resulting from atraumatic origin, and leading to renal failure. Beside to other atraumatic causes like drug abuse, alcohol intoxication, and antihyperlipidemic medications prolonged operation duration in a fixed position is an important cause of this syndrome. Male sex, diabetes mellitus, hypertension and obesity are risk factors for gluteal compartment syndrome associated kidney failure. We report a 56 year old obese patient with a medical history of diabetes mellitus, and hypertension who undergo a nephrectomy operation resulting with gluteal compartment syndrome, and chronic kidney disease. We also highlight the importance of preventive cares and early recognition of gluteal compartment syndrome to avoid further morbidity.

**KEY WORDS:** Buttocks, Kidney failure, Chronic, Rhabdomyolysis

### ÖZ

Gluteal kompartman sendromu genellikle travma dışı nedenlere bağlı olan ve böbrek yetmezliği ile sonuçlanabilen nadir rabdomiyoliz sebeplerinden biridir. Madde bağımlılığı, alkol intoksikasyonu, antihiperlipidemik ilaç kullanımı gibi travma dışı nedenlerin yanında, uzamış ameliyatlarda hastanın sürekli aynı pozisyonda olması da önemli bir nedendir. Erkek cinsiyet, diyabet, hipertansiyon hikayesi ve obezite gluteal kompartman sendromuna bağlı böbrek yetmezliği gelişimi için risk faktörleridir. Biz bu vaka takdiminde 56 yaşında diyabet ve hipertansiyon öyküsü olan ve nefrektomi yapılan hastada gelişen gluteal kompartman sendromu ve kronik böbrek yetmezliğini anlattık. Ayrıca gluteal kompartman sendromu tanısının erken konulması ve önleyici tedbirlerin alınmasının, gelişebilecek morbiditeyi azaltacağına altını çizmek istedik.

**ANAHTAR SÖZCÜKLER:** Gluteal bölge, Böbrek yetmezliği, Kronik, Rabdomiyoliz

### INTRODUCTION

Compartment syndrome is loss of a muscle or muscle group function because of increased intracompartmental pressure. Reduced blood flow and perfusion deficit leads to muscle and nerve necrosis. Rhabdomyolysis and acute kidney failure are severe complications of compartment syndrome (1).

Gluteal compartment syndrome (GCS) is an extremely rare condition and mostly results from atraumatic causes such as prolonged immobilization due to drug abuse, alcoholic intoxication, and extended surgery

duration. The initial symptoms may be mild or asymptomatic but the clinical picture may range from sciatic nerve palsy to acute renal failure, multiorgan failure, and death. Early diagnosis, fasciotomy, and appropriate fluid replacement are most crucial steps of treatment (2).

The objective of this report is to present a GCS case resulting in chronic kidney failure after a prolonged nephrectomy operation and review the literature.

### THE CASE

A 56-year old-obese man (height 175 cm, weight 112 kg, BMI: 36,6) with a medical

Özkan ULUTAŞ<sup>1</sup>  
Hülya TAŞKAPAN<sup>1</sup>  
Ali DOĞAN<sup>2</sup>  
Aski VURAL<sup>2</sup>

- 1 Inonu University School of Medicine, Department of Nephrology, Malatya, Turkey
- 2 Inonu University School of Medicine, Department of Internal Medicine, Malatya, Turkey



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Correspondence Address:

Özkan ULUTAŞ

İnönü Üniversitesi Tıp Fakültesi,  
Nefroloji Bilim Dalı, Malatya, Turkey

Phone : + 90 422 341 06 60

E-mail : drozkanulutas@yahoo.com

history of hypertension (HT), diabetes mellitus (DM) type 2 was referred to our hospital with severe left buttock pain, swelling, ecchymosis around the left hip, diminished urine output and elevated serum blood urine nitrogen (BUN), and creatinine (Cr). It was learned that the patient had undergone a nephrectomy of the right kidney because of nephrolithiasis 3 days ago at another centre. The operation had lasted 6 hours, and the patient was in lateral decubitus position with an angle of 30° during the operation. The serum creatinine level was normal before the surgery. On admission, blood pressure was 120/70 mmHg, heart rate 90/min, respiration rate 22/min and body temperature was normal. Physical examination revealed nothing other than left gluteal region firmness, tenderness, and ecchymosis around left buttock. Urine was brown in colour. At admission, laboratory investigations revealed Cr: 4,2 mg/dl, (BUN): 50 mg/dl, aspartate aminotransferase (AST): 1096 U/L, alanine aminotransferase (ALT): 374 U/L, lactate dehydrogenase (LDH): 1195 U/L, creatinine kinase (CK): 4237 U/L creatinine kinase muscle and brain (CK-MB): 855 U/L, sodium (Na): 130 mmol/l, potassium (K<sup>+</sup>): 5,4 mmol/l, chloride (Cl): 102 mmol/l, and calcium (Ca<sup>++</sup>): 8 mg/dl. Abdominal ultrasonography revealed normal size and echogenicity of left kidney without any pelvicaliceal dilatation, and a superficial left gluteal sonography showed an edematous thickening of subcutaneous tissue. Intravenous fluid treatment, sodium bicarbonate and adequate dosage of mannitol were administered. Although intravenous fluid resuscitation, urine alkalization and forced diuresis with mannitol were performed, oliguria persisted. Fasciotomy was performed on the second day of admission for acute compartment syndrome. Laboratory findings revealed Cr: 7,9 mg/dl, BUN: 76 mg/dl, LDH: 731 U/L, and CK: 17061 U/L. No improvement in urine output was observed after the fasciotomy operation. On the third day of admission, hemodialysis and ultrafiltration were started due to metabolic acidosis, dyspnea and hypervolemia. While further observations showed no improvement in kidney function tests, the patient has been on the hemodialysis program for 17 months.

## DISCUSSION

Gluteal compartment syndrome is a rare cause of compartment syndrome leading to rhabdomyolysis. The main event is muscle destruction and the intracellular components transition to the systemic circulation. Myoglobin, being an intracellular component of a muscle cell is the most important molecule, playing a role in systemic symptoms and particularly the development of acute renal failure. Direct toxicity of myoglobin on the tubular cells, tubular casts leading to obstruction, and intravascular fluid depletion due to accumulation of fluid in the affected compartment are principal reasons of kidney failure in rhabdomyolysis (1).

Prolonged operation duration and positioning of the patient are important causes of GCS. Reisiger et al reported 7 rhabdomyolysis cases from more than 700 patients having a

renal procedure. All 7 patients were in lateral decubitus position and the average duration of surgery was 7,5 hours. The medical history of these patients included HT (n:2), DM (n:1), and morbid obesity (n:2). Similar to Reisiger's findings our patient was an obese patient with a history of DM, HT and a surgery duration of 6 hours (2).

Elevated serum CK levels more than 5 times of normal range or serum myoglobin level greater than 30 µg/ml with clinical symptoms is diagnostic for rhabdomyolysis. Our patient's CK level was 85 times of normal range and he was symptomatic with buttock pain and swelling (3).

Bostanjian et al., compared 6 morbidly obese patient undergoing bariatric surgery, 3 of whom died of complications of rhabdomyolysis, within a control group of 100 patients that underwent the same procedure. All cases had extensive myonecrosis of gluteal muscles requiring debridement. These patient's median body mass index (BMI) was 67 kg/m<sup>2</sup> compared with median BMI 55 kg/m<sup>2</sup> in the control group, and median surgery duration was 5.7 hours compared with 4.0 hours in the control group. He stated that morbidly obese patients with a prolonged surgery duration are more prone to rhabdomyolysis. Male patients with a medical history of DM, HT and obesity have a greater risk of rhabdomyolysis which were similar in our case. He described other potential risk factors as a family history of muscle disease, and usage of cholesterol lowering medications. Routine measurement of CK levels in obese and diabetic patients after the surgical procedure and starting immediate hydration, sodium bicarbonate and mannitol if the CK levels go above 5000 IU/L were recommended (4).

Although there are plenty of data on treatment strategies and clinical outcome of rhabdomyolysis in the English literature, little data is available about the clinical outcome of GCS specifically as it is a very rare syndrome, and most of them are case reports with recovery after fluid treatment and fasciotomy or requiring temporary hemodialysis (5). Bostanjian reported 6 GCS cases, and 3 of them died of fatal complications of rhabdomyolysis (4). In the English literature no definite information is available about the incidence of chronic kidney disease after rhabdomyolysis. Our patient ended up with chronic kidney disease requiring regular hemodialysis. Sciatic nerve palsy have been reported in more than half of the patients with GCS (6), but we did not observe any neurologic deficit in our case.

Preventive cares and early recognition may avoid morbidity and mortality in GCS. The use of soft pillows, mattresses under buttocks, frequent change of decubitus position every 2 hours, and limiting the duration of surgery especially in obese patients, may be preventive. Early recognition and immediate treatment with liberal amounts of fluid, alkalization of urine with sodium bicarbonate, mannitol usage to maintain forced diuresis are other measures to avoid kidney failure-related morbidity and mortality (3,4,7). Hydration with 0.9% saline

solution, urinary alkalization with 50 mmol/L bicarbonate, and 5g/h mannitol infusion were used but adequate urinary output could not be obtained in our patient. Late admission of our patient (60 hours after the surgery) may be an additional factor leading to irreversible kidney failure. It is important to recognize risk factors such as obesity, DM, HT and usage of antihyperlipidemic medications.

It seems that our patient's serum creatinine level was normal before the surgery. However we do not have any information on whether he had proteinuria showing that diabetic nephropathy had started before the surgery. Severe myoglobinuria may cause more damage to the kidney on a background of diabetic nephropathy.

### CONCLUSION

Gluteal compartment syndrome is a rare cause of rhabdomyolysis, generally with an atraumatic origin. Prolonged surgery in the same position without any preventive care increases the risk of GCS. Male subjects with comorbidities like DM, HT and obesity are more prone to GCS. Early recognition and treatment may prevent renal failure and further morbidities.

### REFERENCES

1. Sever MS: Rhabdomyolysis. *Acta Clin Belg Suppl* 2007; (2): 375-379
2. Reisiger KE, Landman J, Kibel A, Clayman RV: Laparoscopic renal surgery and the risk of rhabdomyolysis: Diagnosis and treatment. *Urology* 2005; 66(5 Suppl): 29-35
3. Benevides ML, Nochi Júnior J: Rhabdomyolysis secondary to gluteal compartment syndrome after bariatric surgery: Case report. *Rev Bras Anesthesiol* 2006; 56(4): 408-412
4. Bostanjian D, Anthone GJ, Hamoui N, Crookes PF: Rhabdomyolysis of gluteal muscles leading to renal failure: A potentially fatal complication of surgery in the morbidly obese. *Obes Surg* 2003; 13(2): 302-305
5. Khan FY: Rhabdomyolysis: A review of the literature. *Neth J Med* 2009; 67(9): 272-283
6. Iizuka S, Miura N, Fukushima T, Seki T, Sugimoto K, Inokuchi S: Gluteal compartment syndrome due to prolonged immobilization after alcohol intoxication: A case report. *Tokai J Exp Clin Med* 2011; 36(2): 25-28
7. Rudolph T, Løkebø JE, Andreassen L: Bilateral gluteal compartment syndrome and severe rhabdomyolysis after lumbar spine surgery. *Eur Spine J* 2011; 20: S180-182