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## Delayed Presentation of Acute Gluteal Compartment Syndrome

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Study Design A  
Data Collection B  
Statistical Analysis C  
Data Interpretation D  
Manuscript Preparation E  
Literature Search F  
Funds Collection G

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**Conflict of interest:** None declared

**Patient:** **Male, 23**  
**Final Diagnosis:** **Acute gluteal compartment syndrome**  
**Symptoms:** —  
**Medication:** —  
**Clinical Procedure:** **Gluteal fasciotomy**  
**Specialty:** **Critical Care Medicine**

**Objective:** **Unusual clinical course**

**Background:** Acute gluteal compartment syndrome is a rare condition that usually results from prolonged immobilization following a traumatic event, conventionally involving the presence of compounding factors such as alcohol or opioid intoxication. If delay in medical treatment is prolonged, severe rhabdomyolysis may ensue, leading to acute renal failure and potentially death.

**Case Report:** We report the case of a 23-year-old male with a recent history of incarceration and recreational drug use, who presented with reports of severe right-sided buttock pain and profound right-sided neurological loss following a questionable history involving prolonged immobilization after a fall from a standing position. The patient required an emergent gluteal fasciotomy immediately upon admission and required temporary hemodialysis. After an extended hospital stay, he ultimately recovered with only mild deficits in muscular strength in the right lower extremity.

**Conclusions:** This report demonstrates the importance of early recognition of gluteal compartment syndrome to prevent morbidity and mortality. Compartment syndrome presents in many unique ways, and healthcare practitioners must have a keen diagnostic sense to allow for early surgical intervention. Proper wick catheter measurements should be utilized more frequently, instead of relying on clinical symptomatology such as loss of peripheral pulses for diagnosis of compartment syndrome.

**MeSH Keywords:** **Compartment Syndromes • Myoglobinuria • Rhabdomyolysis • Hemodialysis, Home**

**Full-text PDF:** <http://www.amjcaserep.com/abstract/index/idArt/899249>



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## Background

Compartment syndrome is a condition in which increased compartment pressure within a confined space compromises the circulation and viability of the tissues within that space [1]. The numerous ways compartment syndrome may present lead to a masking of its true etiology. Early recognition by healthcare providers is essential in preventing morbidity and mortality. When compartment syndrome is suspected, immediate fasciotomy is required to improve the overall outcome [2]. Muscles and nerves tolerate ischemia for up to 4 hours with limited sequelae; however, 8 hours of ischemia results in irreversible damage [3]. There is inadequate perfusion and relative ischemia when the tissue pressure within a closed compartment rises to within 10-30 mm Hg of the patient's diastolic blood pressure [4]. Rhabdomyolysis may result from this ischemia, generating a large release of potassium and a heme-containing protein, myoglobin, leading to severe acidosis and renal tubule cast formation, respectfully. Myoglobin can get deposited in the distal renal tubules and can lead to acute renal failure [2].

## Case Report

A 23-year-old African American male presented via the emergency medical service (EMS) with complaints of severe right-sided buttock pain with associated profound, right-lower-extremity sensory and motor neurological loss. On arrival at the emergency room, the patient stated he walked about 2 miles to a family member's house and then his legs started to hurt. He stated he then fell backward from a standing position onto his right buttock due to his acute leg pain, but was able to stand and walk to his bedroom. He then slept for an unknown period of time, approximately 12 hours, eventually awakening to find himself lying on the ground unable to move. This prompted a family member to call EMS. His past medical/surgical/family history was unremarkable. The patient did have a previous drug abuse history involving heroin, cocaine, and street pills. The patient admitted to occasional alcohol and marijuana use.

He was hemodynamically stable with blood pressure 110/72 mm Hg and heart rate 79 beats/min. Initial exam revealed an anxious, alert, and oriented male with an erythematous right buttock with a well-defined, but irregular border that was tender to light palpation. Vascular exam showed left dorsalis pedis pulse as +2/4 with right dorsalis pedis pulse as +1/4. No bilateral pedal edema was seen. Neurological exam showed cranial nerves 2–12 grossly intact with complete loss of voluntary motor function to the right lower extremity. Passive mobilization of the right-lower extremity elicited severe gluteal pain. Sensory abilities were also limited with regard to differentiation between sharp and dull touch. Head, ears, eyes, nose, and throat (HEENT)/cardiopulmonary/abdomen exams were unremarkable.

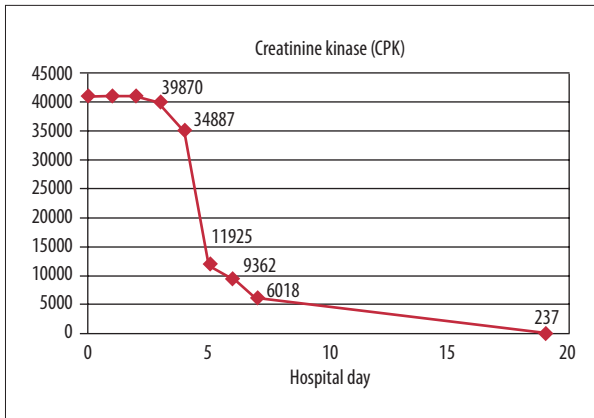
An initial electrocardiogram (EKG) showed peaked T-waves in precordial leads, but was otherwise unremarkable. X-rays of right hip and pelvis revealed no fracture, but did show some soft tissue swelling. A computer tomography (CT) scan of the pelvis revealed edema of the right gluteal muscles. Laboratory assessments were as follows: white blood cell count (WBC) 32.5; hemoglobin/hematocrit (Hgb/Hct) 17.6/53.6; potassium 5.9; blood urea nitrogen (BUN) 23; creatinine 4.2; aspartate transaminase (AST) 1616; alanine transaminase (ALT) 1317; troponin 8.28; blood alcohol level and acetaminophen level negative; urine drug screen positive for opium and benzodiazepine; salicylate level 4.4; lactic acid 3.8; creatine phosphokinase (CPK) > 41,000, CKMMB >270; and a urinalysis showing amber-colored urine with large blood on dipstick with microscopy showing red blood cells (RBC) 0–2 per high-powered field.

The patient received a 4-liter bolus of normal saline, calcium gluconate, insulin, and dextrose in the emergency department and was emergently seen by orthopedic surgery for potential compartment syndrome. Wick catheter measurements were obtained on three occasions, demonstrating a 62 mm Hg pressure in the right gluteal compartment, which was consistent with the diagnosis of acute compartment syndrome. The patient immediately underwent an emergent fasciotomy in the operating room with plans to leave the compartment open. Following emergent surgery, the patient was admitted to the intensive care unit for further monitoring. Nephrology was consulted for his acute kidney injury. Cardiology was consulted for elevation in troponin, which was deemed unlikely to be a cardiac event. The patient was continued on a sodium bicarbonate infusion due to his acute kidney injury.

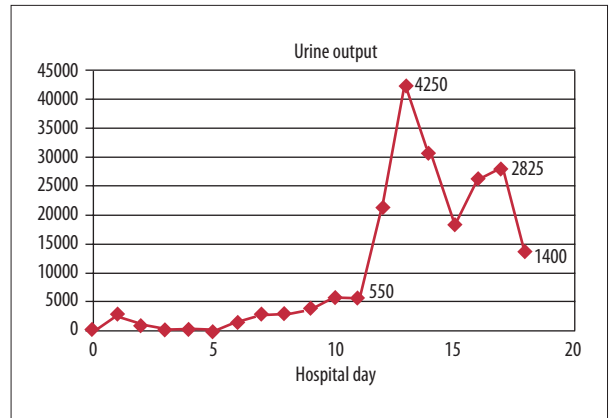
The patient continued to have oliguria and a dialysis catheter was placed for expected hemodialysis, which was later initiated on hospital day 3. Transthoracic echocardiogram and VQ-scan eventually returned within normal limits. On post-op day 5 from his fasciotomy, the patient was taken to the operating room for irrigation/debridement with closure of the fasciotomy to the right buttock. The patient continued to have a mild leukocytosis without clinical/cultural evidence of infection despite cefazolin treatments. Infectious disease was consulted and the patient was started on a brief course of vancomycin with eventual improvement in leukocytosis. CPK and creatinine slowly improved over the course of the next 3 weeks. The patient was eventually discharged home with outpatient rehabilitation therapy.

## Outcome and follow-up

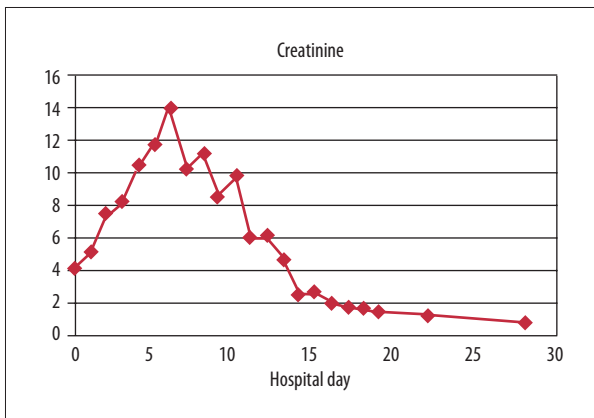
The Figures 1–6 provided show the gradual improvement of creatinine, CPK, WBC, and urine output levels throughout the hospital stay. Hemodialysis was a temporary measure in this case and eventually could be withheld with return to the patient's baseline creatinine of less than 1. The gluteal incision healed



**Figure 1.** This graph depicts the patient's CPK levels during his hospital stay. CPK measured in units/L.



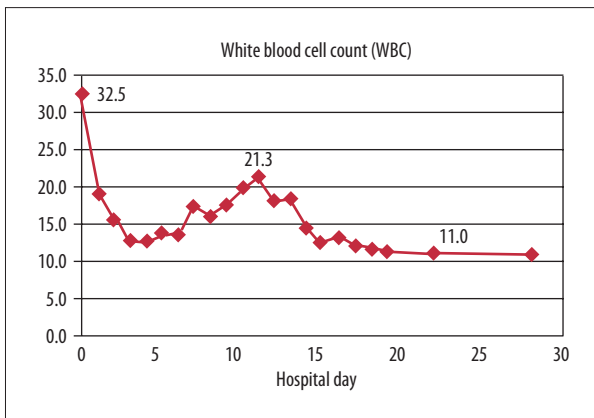
**Figure 4.** This graph depicts the patient's urine output during his hospital stay. UP measured in mL. Dialysis was initiated on hospital day 2 and ceased on hospital day 14.



**Figure 2.** This graph depicts the patient's creatinine levels during his hospital stay. Creatinine measured in mg/dL. Dialysis was initiated on hospital day 3 and ceased on hospital day 14.



**Figure 5.** CT image of pelvis showing edema of right gluteal muscles depicted by yellow arrow.



**Figure 3.** This graph depicts the patient's WBC levels during his hospital stay. WBC measured in 10<sup>3</sup>/uL. Vancomycin treatment started on day 11.



**Figure 6.** Picture of closed fasciotomy incision to right buttock.

well, and the patient's ambulation continued to improve with assistance of outpatient physical rehabilitation, where flexibility and strengthening exercises were utilized. The patient was followed for approximately two months before being lost to follow-up. At the last follow-up appointment, the patient had active but weak dorsiflexion/plantarflexion of the right ankle, moderately reduced right-sided quadriceps function, normal vascularity overall, and hypersensitive right calf/foot areas.

## Discussion

Untreated compartment syndrome has serious implications, resulting in muscle and nerve necrosis, systemic acidosis, rhabdomyolysis with myoglobinuria, and subsequent renal failure and possible death [5,6]. The presented case demonstrates the severe complication of renal failure requiring hemodialysis due to acute gluteal compartment syndrome when there was a delay in seeking medical care. Fortunately, our patient's renal function and urine output improved about one week after hemodialysis was initiated, allowing for its eventual termination. However, long-term neuromuscular deficits resulting from his apparent sciatic nerve damage due to prolonged increased compartmental pressures may be permanently present. Continued physical rehabilitation, along with cessation of recreational drug use, is paramount to ensure maximal recovery from his deficits.

A series of wick catheter measurements were utilized in diagnosing this case of acute compartmental syndrome. The patient's gluteal compartment measurements were 62 mm Hg on three separate studies, while his diastolic blood pressure was 72. Most studies involving wick catheter measurements in diagnosing acute compartment syndrome involve traumatic tibial fractures, so practitioners must rely on extrapolation for the gluteal compartment. One-time intracompartmental pressure measurements can overestimate the rate of compartment syndrome and raise concern regarding unnecessary fasciotomies [8]. Traditional, absolute pressure readings of greater than 30 mm Hg should not be used to diagnosis acute compartment syndrome. The importance of serial measurements, along with interpreting the data in correlation with

clinical observation, is key to appropriately and quickly diagnosing acute compartment syndrome.

The diagnosis of compartment syndrome should be made on the basis of sequential differential pressure measurements rather than awaiting the development of clinical signs and symptoms [7]. Practitioners who are unfamiliar with the pathophysiology of compartment syndrome often place emphasis on the presence of pulses to incorrectly rule out compartment syndrome [1]. The presented case is a prime example of an acute compartment syndrome that might have been missed due to the presence of bilateral lower extremity pulses. Treatment should include immediately relieving all external pressure on the compartment, and the limb should neither be elevated nor placed in a dependent position. Placing the limb level with the heart helps to avoid reductions in arterial inflow [9] and avoids increases in compartment pressures from dependent swelling, both of which can exacerbate limb ischemia. A keen sense by providers for diagnosing and treating compartment syndrome is a requirement for preventing severe complications, prolonged hospital stays, and even death.

## Conclusions

The presented case highlights the crucial importance of early recognition and proper diagnosis by healthcare providers of acute compartment syndrome. In our case, peripheral pulses remained palpable despite severely elevated gluteal compartment pressures obtained by serial wick catheter measurements. Failure to have obtained the true diagnosis and undergo an emergent fasciotomy in a timely matter would likely have resulted in devastating consequences. Fortunately, hemodialysis was only utilized as a temporary measure in this case.

## Competing interests

None.

## Acknowledgements

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