

Gluteal compartment syndrome: a serious pain in the rear

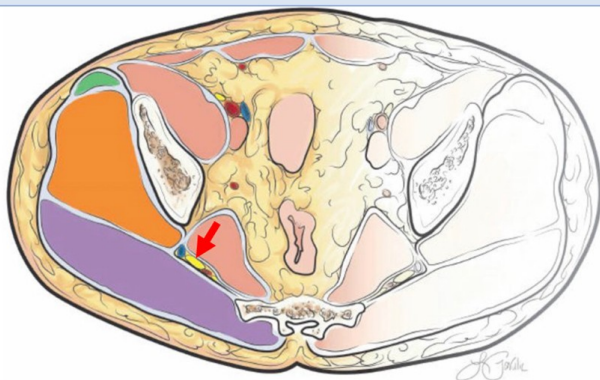
Brennan Bowker MHS, PA-C, CPAAPA,^{1,2} Deborah Cooke MHS, PA-C,^{2,3} Michelle Laraia PA-S,² Khushi Dagli PA-S,² Natalie Martinico PA-S,² Allegra Rasmussen PA-S,² Brianna Sullivan PA-S,² Carly Fabbri MHS, PA-C³

¹Yale New Haven Hospital, Department of Surgery, New Haven, CT
²Quinnipiac University, Department of Physician Assistant Studies, Hamden, CT
³Yale New Haven Hospital, Department of Orthopedic Surgery, New Haven, CT

Introduction

- Compartment syndrome (CS)** is a potentially limb-threatening condition characterized by elevated intracompartmental pressure that compromises local perfusion, leading to ischemia and potential necrosis of soft tissue and neural structures.^{1,2}
- Acute compartment syndrome is considered a *surgical emergency*, as delay in treatment increases risk of morbidity and mortality.
- While CS is primarily a clinical diagnosis, measuring intra-compartmental pressures can aid in diagnosis.³
- Classical signs include the 5-P's: pain, pallor, paresthesia, paralysis, and pulselessness.^{1,4}
- The distal lower extremities are most affected, as limited space restricts expansion during trauma or swelling.⁵
- Gluteal compartment syndrome is extremely rare and predominantly associated with extended periods of immobility and traumatic injury; however, there is a growing body of literature reporting incidence in the context of illicit substance use and overdose.^{3,6-8}
- Diagnosing GCS can be challenging, particularly in patients with altered mental status or unreliable histories. Symptoms such as pain and pallor may be subtle or overlooked.⁷
- Urgent compartmental decompression via fasciotomy is considered the standard of care.⁷

Fig 1. Gluteal Compartment Anatomy⁹



The gluteus maximus in purple, gluteus medius and minimus in orange, and tensor fascia lata in green. The sciatic nerve (red arrow) sits between the gluteus maximus and piriformis muscles.

Case Description

History of Presenting Illness:

A 60-year-old male with a history of polysubstance use presented to the ED with altered mental status after ingesting an unknown substance the night prior. Patient's last well-known status was at least three days prior.

Vitals: T 97.4°F, HR 91 bpm, BP **66/36 mmHg**, RR 12, O2 95% RA
GCS of 10 (E2, V4, M4)

Initial Hospital Course:

- Fluid bolus given with *sustained improvement* in blood pressure
- Naloxone was administered, but the patient remained confused
- At no point was he able to verbalize any history or subjective complaints, he just yelled profanities at staff
- He was observed to have gross motor function in all four extremities (swinging and kicking at staff)

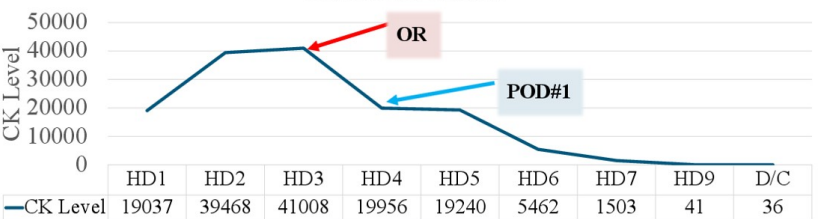
First 48 Hours:

- Admitted to the medical stepdown unit for treatment of rhabdomyolysis
- Noted to have a deep tissue injury to the left buttock
- General surgery consulted, buttock was soft and nontender. He withdrew to pain indicating motor and sensation were intact
- Kidney functioned and rhabdomyolysis continue to worsen after 24 hours, so hemodialysis was initiated

Laboratory Analysis

Component	Result	Component	Result
WBC	12.8 x 1000/ μ L	Tbili	0.6 mg/dL
Hemoglobin	17.4 g/dL	Dbili	<0.2 mg/dL
Hematocrit	52%	AST	1,492 U/L
Platelets	108 x 1000/ μ L	ALT	686 U/L
Sodium	138 mmol/L	Alk Phos	52 U/L
Potassium	5.2 mmol/L	Lactate	6.3 mmol/L
Chloride	103 mmol/L	CK	19,037 U/L
Bicarbonate	13 mmol/L	Toxicology	+ fentanyl, + cocaine
BUN	37 mg/dL	Blood culture	Coagulase negative Staphylococcus
Creatinine	3.9 mg/dL		

CK Level Trend



Hospital Course

HD#3: CK, Cr levels rise despite aggressive resuscitation

CVVH, HCO3 drip Mentation improved with CVVH

HD#3: Complains of LLE numbness

CT pelvis obtained: marked edema in the gluteal musculature Neurology consultation: 3/5 power in LLE; concern for sciatic nerve palsy

HD#3: Unable to move LLE (2hours after neurology eval)

Urgent orthopedic consultation 0/5 power of the entire LLE

HD#3: OR for urgent gluteal fasciotomy

Tensor fascia lata and gluteus medius compartments both tight No obvious myonecrosis

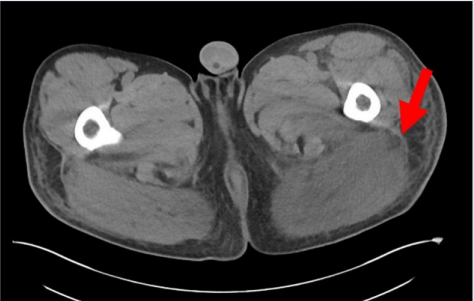
Returned to MICU for ongoing care

CKs begin to improve within 48h Extubated, unable to move LLE

Remained in hospital for over 12 weeks

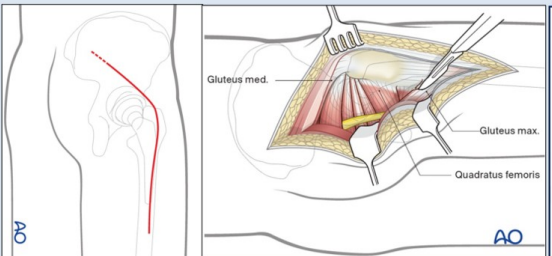
Hip flexion but no sensation, renal recovery achieved Discharged to acute rehabilitation

Cross Sectional Imaging



Marked edema involving the **left gluteal and adductor musculature** with asymmetric subcutaneous edema and fluid tracking along the left thigh. Concerning for myositis.

Fig 2. Kocher-Langenbeck approach¹⁰



A curved incision is made along the posterior aspect of the hip from the posterior superior iliac spine towards the greater trochanter. Dissection is performed through the gluteus maximus muscle fibers to expose and decompress all three gluteal compartments, with direct identification of the sciatic nerve.

Discussion

- Gluteal compartment syndrome is exceedingly rare. Diagnosis can be challenging as the buttock may objectively feel soft even when compartment syndrome is present.¹¹
- When left untreated, it can result in multiple complications including sciatic nerve palsy.
- Although the sciatic nerve is not part of the gluteal compartment, its position posterior to the gluteus maximus and medius puts it at risk for compression secondary to swelling.⁴
- Rhabdomyolysis is a potentially lethal complication of the syndrome. As myocytes die, intracellular proteins such as myoglobin and creatine kinase are released into the bloodstream and can result in acute kidney injury or even renal failure.¹²
- Gluteal compartment syndrome is historically managed by urgent fasciotomy, often done via the Kocher-Langenbeck approach,¹⁰ regardless of the presence of neurological deficit.¹
- A recent meta-analysis found no significant difference in the incidence of neurological deficits between medically and surgically managed patients who presented without an initial neurological deficit.¹

Conclusion

Gluteal compartment syndrome is a rare but potentially devastating condition that requires a high index of suspicion, particularly in patients with prolonged immobilization, trauma, or drug overdose. Delayed diagnosis can result in irreversible neurovascular damage, muscle necrosis, and poor functional outcomes. Early recognition and prompt surgical decompression are critical to optimizing patient recovery and minimizing long-term morbidity.

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