Delayed Presentation of Acute Traumatic Gluteal Compartment Syndrome with Severe Rhabdomyolysis Post-Fall

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Introduction

- Compartment syndrome occurs due to increased pressure within a closed fascial space impairing the delivery of blood and nutrients to the area causing tissue damage and eventually necrosis.1
- The incidence of compartment syndrome is about 1/100,000 females and 2.7/100,000 males. It typically manifests in the lower extremity as a result of soft fracuture; occurrence in the gluteal compartment is much less common.2 According to the largest meta-analysis to date, only 139 cases have been described.1
- Gluteal compartment syndrome is a very rare manifestation that poses permanent and life-threatening risks including sciatic nerve neuropathy and muscle necrosis.1
- Gluteal compartment syndrome most commonly arises from prolonged immobilization due to alcohol or drug intoxication or improper positioning during surgical procedures where the patient has been lying on the hip for hours at a time without moving. The most commonly associated surgical positioning is the left lateral decubitus position.1,4
- Gluteal compartment syndrome rarely occurs secondary to trauma. Documented cases have typically involved minor incidents such as a fall from standing.5,6
- The most common risk factor for gluteal compartment syndrome is obesity.6,11 Most recently there was found to be increased risk associated with the use of epidural anesthesia as well.4,7
- Less specific findings like pain, erythema, and swelling are more common in gluteal compartment syndrome. The 6 Ps that are classically associated with compartment syndrome present much later in gluteal compartment syndrome.1
- The diagnosis of gluteal compartment syndrome is primarily made clinically. However, the diagnosis is often missed as patients may present with only minor physical manifestations initially.7 Measuring compartment pressures can be used to confirm the diagnosis. If pressures reach greater than 30mmHg for more than 8 hours, the blood delivery becomes impaired and irreversible damage occurs.4,8
- In the largest meta-analysis to date on gluteal compartment syndrome, bilateral compartment syndrome occurs in 15% of cases and is associated with a 70% chance of survival.1
- In this same study, only 51% of patients healed without long-term deficits regardless of whether the gluteal compartment syndrome was unilateral or bilateral.4
- Treatment approaches to gluteal compartment syndrome include fasciotomy or, simply treating the various sequelae, using “medical management.” For instance, rhabdomyolysis can be effectively treated with new technology like continuous renal replacement therapy.1

Table 1: Most common physical findings of gluteal compartment syndrome

<table>
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<tr>
<th>Less common</th>
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<tr>
<td>Pulse Pulsus Paradoxus</td>
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<td>Perforation of the latissimus dorsi</td>
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<td>Pain, myalgia over the gluteal region, tenderness to palpation, swelling or edema of the affected hip</td>
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Figure 1: Post-operative fasciotomy site

Case Description

- 37yo black male presenting to the ED after waking up experiencing muscle, vomiting, a stiff, tight, and tender left thigh and hip, and difficulty ambulating on the left leg. At that time, he denied lower extremity pain or paresthesias.
- Sustained a fall standing the night prior and had no loss of consciousness or head strike.
- At home, he drank a substantial amount of alcohol and took one oxycodone for the pain then fell asleep.
- Denied any past medical history, surgical history, medications or allergies.
- Denied drug or alcohol use/history.
- Denied any fevers, chest pain, shortness of breath, abdominal pain, headaches, or lower extremity weakness.
- After a 5-6 hours in the ED, he began experiencing “excruciating” pain to light touch on his left hip and new onset of left foot numbness.

Initial Physical Exam

- L5/S1 numbness to 50mA with 81 beats/min 98.2°F 18 breaths/min 100% O2.
- General – well appearing, no acute distress, Afebrile.
- Heart – normal S1 and S2 without murmurs, gallops or clicks.
- Lungs – all lung fields clear to auscultation bilaterally without wheezes, ronchi, or rales.
- Musculoskeletal – skin warm, dry, and intact with no lacerations, ecchymosis or soft tissue swelling. Tenderness along greater trochanter and full range of motion passively and actively with significant pain.
- Neurovascular – straight leg is 5/5 in all extremities, sensation intact. Warm, dry lower extremities 2+ posterior tibialis and dorsalis pedis pulses bilaterally.

Initial Diagnostic Studies

- WBC 14.4x10/3 L (H)
- Potassium 5.8 mEq/L (H)
- Creatinine 2.2 mg/dL (H)
- Increased to 3.4 mg/dL on day 2
- Blood glucose 55 mg/dL (L)
- Estimated GFR 34 mL/min (L)
- Decreased to 20 mL/min on day 2
- Creatinine Kinase 17,465 U/L (H)
- Increased to > 70,000 U/L on day 2
- Creatinine 6.9 mg/dL (H)
- Toxicology Screen – negative
- EKG – normal sinus rhythm
- x-ray of left hip – no fracture, subluxation, ossusus or soft tissue swelling and normal joint space.

Differential Diagnosis

<table>
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<tr>
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<tr>
<td>Deep Vein Thrombosis (DVT)</td>
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<tr>
<td>Fracture/Dislocation of Hip/Femur</td>
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<tr>
<td>Arterial Embolism</td>
</tr>
<tr>
<td>Septic Arthritis</td>
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<tr>
<td>Saddle Anesthesia</td>
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Management

- In the ED, the patient received:
  - 1000mL/LV bolus of normal saline
  - 15g of sodium acetate, sodium salicylate PO
  - 100mg of acetaminophen and 400mg of folic acid PO daily and 2mg of heparin IV every 6 hours as needed for withdrawal
- Single dose of enoxaparin 40mg subcutaneously for DVT prophylaxis
- The patient was admitted due to his acute pain, severe rhabdomyolysis, and acute kidney injury.
- Pain control with 1000mg acetaminophen PO every 6 hours, 0.5mg of hydrocodone IV every 3 hours, and 5% lidocaine patch daily.
- IV Lactated rings at 200c/hr with strict I&D monitoring
- Due to growing concern for compartment syndrome, enoxaparin was held
- On day 2, patient began experiencing severe left hip pain, left foot drop, sensory deficits and decreased motor function of left foot and ankle. Immediate CT scan showed fluid attenuation confirming the diagnosis of gluteal compartment syndrome. Patient was rushed to the OR for emergent left gluteal compartment syndrome with neurolysis and decompression of the left sciatic nerve.
- Patient had immediate return of sensation and motor function post-op.
- Neurological exams were performed every 4 hours.
- A wound vac was placed on the 7th day at negative 50mHg and remained until the 9th day when he returned to the OR for wound closure and Jackson-Pratt drain placement.

Patient Outcome

- The patient was discharged after 11 days and was scheduled for follow-up with the plastic surgeon.
- Discharge Medications:
  - Acetaminophen 1000mg up to 4x/day as needed for pain
  - Tramadol 25mg up to 4x/day as needed for pain
  - Folic acid 400mg once daily
  - Thiourea 100mg once daily
  - Polyethylene glycol 17g pack once daily
- Senna-Docusate 8.5mg – 2 tablets twice daily
- At follow up 10 days later, patient stated he was doing well. JP drain was removed and patient was held to slowly increase activity and return in 2 weeks for surgery removal.

Figure 2: Computed tomography of left gluteal compartment

Discussion

- Gluteal compartment syndrome diagnosis is frequently delayed due to the lack of physical manifestations indicating urgency like paresthesia and pallor of the extremity. Therefore, clinicians need to maintain a high index of suspicion and keep it on their differential.
- The most common sequelae that occur as a result of gluteal compartment syndrome include rhabdomyolysis, organ failure, sepsis and sciatic nerve neuropathy and if the compartment syndrome is not relieved in a timely manner, permanent neuropathy, motor losses, or even death can occur.9
- There is some debate about whether or not immediate fasciotomy or medical management of gluteal compartment syndrome is most appropriate. The most recent meta-analysis showed that in patients without neurologic deficits, there was no increased risk for permanent neurovascular damage between patients who received fasciotomy and patients who managed medically. However, once neurologic deficits appear, fasciotomy should be performed to avoid lifelong deficits. A treatment algorithm is proposed.1

Table 2: Treatment algorithm for gluteal compartment syndrome

Conclusion

- Gluteal compartment syndrome rarely manifests that is hard to diagnose, but left untreated, can cause permanent neurological deficits and, in the worse cases, death.
- Most patients will present with non-specific and, initially, only minor physical exam findings including pain, erythema, and edema. The classic “6 Ps” are less common with gluteal compartment syndrome.
- Gluteal compartment syndrome usually occurs due to immobilization for a prolonged period of time paired with certain surgical positioning or intubation, but may also result from trauma.
- Sequealae include rhabdomyolysis, electrolyte abnormalities, acute kidney injury, organ failure, and sciatic neuropathy. Each of these manifestations must be addressed promptly.
- Treatment options include fasciotomy or medical management, but regardless of which option is chosen, treatment must be initiated in a timely manner. It is imperative that providers are diligent not to miss this diagnosis in order to prevent associated morbidity and mortality.

References