

Bilateral post-traumatic gluteal compartment syndrome: A case report and review of literature

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ABSTRACT

Gluteal compartment is a rare site for compartment syndrome. Gluteal compartment syndrome has most commonly been described in the literature as occurring after prolonged immobility associated with substance abuse, improper operative positioning, sickle cell-induced infarct, post-traumatic and spontaneous superior gluteal artery rupture, exercise, and post-arterial embolization of the internal iliac artery prior to abdominal aortic aneurysm repair. Trauma is rarely associated with this syndrome. Gluteal compartment syndrome occurs in approximately 0.9% of trauma patients. Posttraumatic gluteal compartment syndrome develops because of edema with traumatic contusions, crush injuries and hematoma formation due to blunt superior or inferior gluteal artery injuries in all compartments of the gluteal region. Only 6 previous cases have been reported in the literature. Two previous cases involved positioning for urological procedures, while the other cited causes of bilateral gluteal compartment syndrome include exercise-induced, trauma, and prolonged immobilization from substance abuse. One of the most immediately devastating results of a missed compartment syndrome is the risk of the development of rhabdomyolysis with the resulting sequelae of myoglobinuria, hyperkalemia, and acidosis resulting in renal failure, shock, multiple organ failure, disseminated intravascular coagulation, and possibly death. Here we report a case of posttraumatic bilateral compartment syndrome which developed secondary to pressure due to patient being trapped under a vehicle following a vehicular accident. He was operated upon and a bilateral fasciotomy was done. Although he did not develop any renal complications, the sciatic nerve palsy on the left side did not recover. The patient is still under follow up.

Keywords: *Bilateral, gluteal compartment syndrome, post-traumatic*

Introduction

Gluteal compartment syndrome is a rare entity. It is known to

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occur following prolonged immobility associated with substance abuse, improper operative positioning, sickle cell-induced infarct, post-traumatic and spontaneous superior gluteal artery rupture, exercise, and post-arterial embolization of the internal iliac artery prior to abdominal aortic aneurysm repair. Compartment syndrome occurring after trauma occurs less frequently and it occurring bilaterally is even rare. Early diagnosis and management is crucial as the complications apart from sciatic nerve palsy that may be associated with can be devastating which include development of rhabdomyolysis with the resulting sequelae of myoglobinuria, hyperkalemia, and acidosis resulting in renal failure, shock, multiple organ failure, disseminated intravascular coagulation, and possibly death.^[1,2]

Case Report

A 28-year-old well-built male was brought to our emergency department with a history of vehicular accident. As per the patient and the police officials, the driver was trapped in the cabin under heavy weight for almost 14 hours as it took a long time to extricate him from the trapped position. His main complaints were severe pain along the right lower limb and numbness and loss of sensation over the left lower limb. On arrival, the patient was conscious, co-operative, and well oriented to time, place, and person. His vitals were stable. He appeared pale and dehydrated. There was a complete sensory loss around the left leg and inability to dorsiflex the left ankle. However, the right lower limb had full motor power but sensations were diminished.

There were multiple blisters over the buttocks, which were more marked over the left side [Figure 1]. The gluteal region was quite tense and was firm to hard on palpation, with sensory loss. Radiological evaluation did not reveal any abnormality.

Based on history and the clinical findings, the diagnosis of posttraumatic bilateral gluteal compartment syndrome was made. Emergency decompression of the gluteal compartments on both sides using the Kocher–Langenbeck approach was performed. The muscle in the gluteal compartment were found to be edematous and partly necrosed on the left side, whereas on the right side no necrosis was found [Figure 2]. The sciatic nerve was not explored. The primary closure of the wounds could not be done, and the wounds were closed after an interval of 7 days.

Postoperatively, the patient did not develop any renal complications and we could do a secondary closure.

The sciatic palsy on the left side did not recover. The patient was discharged after 2 weeks of hospital stay.

Gluteal compartment syndrome is an infrequently diagnosed condition and knowledge of the gluteal region anatomy is essential to its diagnosis and treatment. A complete understanding of the gluteal anatomy is necessary to understand how to release an associated compartment syndrome properly.

Anatomy^[1,2]

Classically, three compartments have been described in the gluteal region [Figure 3]:

- The gluteus maximus, which is the main extensor and external rotator of the leg, is covered on its superficial and deep side by a fibrous fascia that extends from the iliac crest superiorly, sacrum, coccyx, and sacrotuberous ligament medially, and is contiguous with the fascia lata of the thigh. This compartment contains the inferior gluteal nerve and vessels that emerge from the inferior border of the piriformis. Although the sciatic nerve is not in this compartment, it can be involved due to close proximity.
- The gluteus medius runs deep and superolateral to the gluteus maximus and is separated from the gluteus maximus by a deep gluteal fascia, and superficially confined to the gluteus minimus by aponeurosis. The gluteus medius compartment extends from the ilium to the greater trochanter of the hip. Its boundaries include the gluteal aponeurosis, tensor compartment and iliotibial tract, and ilium. The superior gluteal nerve and vessels lie in this compartment and emerge from the superior border of the piriformis.
- Finally, the smallest compartment consists solely of the tensor fascia lata, which is the lateral aspect of the gluteus medius and minimus compartments. Its boundaries include the gluteus medius and minimus and gluteal fascia, which inserts onto the iliotibial tract.



Figure 1: Right gluteal region showing blisters due to compartment syndrome

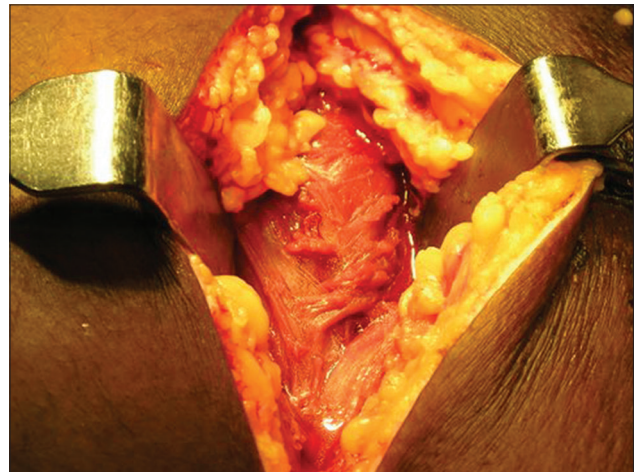


Figure 2: After release of compartments

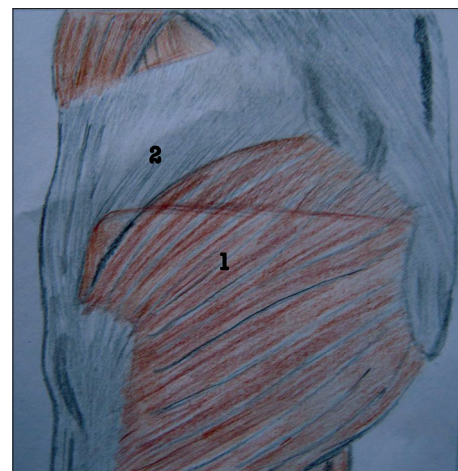


Figure 3: Compartments of gluteal region. 1: gluteus maximus, 2: gluteus medius

The three compartments are covered with non-distensible gluteal fascia and aponeurosis, which confine them to a limited space.

Diagnosis

Most frequently, gluteal compartment presents as severe pain, tenseness, and swelling in or around the affected buttock. Additionally, tenderness, hardness, skin abnormality, and pain on the passive motion in or around the affected buttocks can be observed. In the later stage of the condition, the patient may demonstrate sciatic nerve dysfunctions, such as deficits in the leg, thigh, and foot strength or pain in the posterior thighs and legs and lateral legs and feet. On testing with a dipstick, the urine may be tea-colored or positive for blood without the presence of any red cells, representing myoglobinuria.

In the study by Henson *et al.*, out of 28 cases, 46.4% were diagnosed based on measuring compartmental pressures and 54% based on patient symptoms and clinical findings.^[3]

Although direct measurement of compartment pressures aids in confirmation of compartment, any measured value should be correlated with the patient's blood pressure. Intracompartmental pressures > 30 mmHg suggests the need for fasciotomy. Measuring compartment pressures may be useful in diagnosis, but the pressure threshold is unknown. Leg and forearm compartment pressures have been extensively studied; nonetheless, no equivalent guidelines for surgical decompression of gluteal compartment syndrome have been determined.^[4] A previous study by Yoshioka^[5] found normal gluteus maximus and medius compartment pressures to be approximately 13 and 14 mmHg, respectively. However, if clinical suspicion is high enough, fasciotomies may be performed in view of clinical findings alone.

Treatment

Typically, gluteal compartment syndromes is treated with immediate fasciotomy. However, based on the case series of atraumatic gluteal compartment syndrome with crush syndrome and sciatic nerve palsy, Lachiewicz^[6] reported that 2 out of 6 patients showed improvements with conservative management, and even in the 2-year follow-up, they had no residual disability from sciatic nerve palsy. Clinical symptoms, deficits in neuromuscular functioning, or significantly elevated intracompartmental pressures are indications for surgical decompression. The exposure for the gluteal compartment has been described by Henry,^[7] consisting of a question mark-shaped incision extending from the posterior superior iliac spine, along the iliac crest, over the greater trochanter to the level of the inferior gluteal fold. The incision is then extended medially beneath the buttocks and down the midline of the upper thigh. This approach allows good exposure with minimal risk to the neurovascular structures.^[4] Another option for decompression is the extended Kocher–Langenbeck approach, which we chose for our decompression exposure.^[8] This approach indirectly decompresses the sciatic nerve, which is not found in a fascial compartment.^[2] At completion, the wounds may not be able to

be closed primarily due to swelling and may require a return to the operating room once the swelling resolves. Vacuum-assisted closure may also be an option.^[9]

Complications

Failure to recognize gluteal compartment syndrome can have devastating consequences. One of the most immediately devastating results of a missed compartment syndrome is the risk of the development of rhabdomyolysis, with the resulting sequelae of myoglobinuria, hyperkalemia, and acidosis resulting in renal failure, shock, multiple organ failure, disseminated intravascular coagulation, and possibly death.^[10,11] Basic management principles include maintaining a renal protective urine output of 150-300 mL per hour, consideration of urine alkalization with sodium bicarbonate, and the use of mannitol to promote diuresis and prevent formation of casts in the kidney tubules.^[12] Renal dialysis should also be considered if renal failure is advanced.^[13]

Late consequences include weakness of abductors, external rotators, Trendelenberg gait, scar dehiscence/skin depression over area of injury, and sensory disturbances on the sole of foot with associated decreased anterior tibial/patellar reflexes.^[3]

Postoperative gluteal compartment syndrome is a preventable condition. Prevention should center on intraoperative padding and positioning, intraoperative repositioning, and restricting the length of the procedure. If an acute gluteal compartment is encountered, early recognition and decompression can help decrease long-term complications.

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