

Case report

Gluteal compartment syndrome caused by traumatic rupture of the superior gluteal artery

Djemil Omerović¹, Ismet Gavrankapetanović¹, Faris Gavrankapetanović¹, Amel Hadžimehmedagić², Faruk Lazović¹, Amir Ahmetović¹

¹Orthopedic and Traumatology Clinic, University Clinical Center Sarajevo, Sarajevo, Bosnia and Herzegovina

²Clinic for Vascular Surgery, University Clinical Center Sarajevo, Sarajevo, Bosnia and Herzegovina

Summary

Introduction. We report a case of a sixty-year-old man diagnosed with gluteal compartment syndrome caused by traumatic rupture of the superior gluteal artery associated with fracture of the inferior pubic ramus and blunt trauma.

Case report. A patient was injured falling from a height of four meters. Signs of compartment syndrome and sciatic nerve compression developed three hours after the injury. The patient went through a computerized tomography (CT) scan procedure with contrast, which showed a hematoma in the gluteal region, but without signs of active bleeding. However, after observation and monitoring of the patient, CT angiography was performed which revealed a rupture of the superior gluteal artery. Fasciotomy and debridement were performed and the patient was diagnosed with gluteal compartment syndrome and rupture of the superior gluteal artery. Surgery resulted in a significant improvement of the patient's condition.

Conclusion. Traumatic gluteal compartment syndrome is a rare condition. Gluteal compartment syndrome should be taken into consideration in each patient with pelvic trauma and hematoma in the gluteal region whose neurological status is affected. Prompt diagnosis and fasciotomy are crucial in the treatment and fasciotomy presents the gold standard in the treatment.

Keywords: gluteal compartment syndrome, pelvic trauma, superior gluteal artery rupture, sciatic nerve compression

Introduction

Compartment syndrome is an increased soft tissue pressure inside a close anatomic space in the body (muscle compartment) which, if not treated, leads to the tissue necrosis, functional

impairment and nerve damage. The local ischemia produced by a compartment syndrome must be relieved by decompressing the muscle compartment [1,2].

Gluteal compartment syndrome is a rare type of compartment syndrome [3]. Most com-

Correspondence to:
Demil Omerović, MD, PhD
University Clinical Center Sarajevo
Bolnička 25, 71000 Sarajevo
dr.omerovic@gmail.com

partment syndromes are caused by trauma, with the exception of gluteal compartment syndrome, which usually occurs as a result of the prolonged immobilization and postarthroplasty analgesia [4]. There are three gluteal compartments of the buttocks: one contains *musculus tensor fasciae latae*, the second *musculus gluteus medius* and *musculus gluteus minimus* and the third contains the *gluteus maximus*. It is important to note that the sciatic nerve lies adjacent to the *gluteus maximus* and can be compressed by it during pathologic conditions [5].

Case report

A sixty-year-old man was brought to the Center for Emergency Medicine at 5.35 p.m. following the injury caused by falling from a 4-meter height, 6 hours earlier. He fell down on his left buttock. Six hours after the injury he could not move his left leg and felt paresthesia over his left leg, as well as severe pain in the left hip. He was injured outside of his town and primarily treated by the emergency medical team. Afterwards, he was referred to a local hospital. When admitted, the patient was conscious, orientated and communicative. On physical examination he complained of low back pain, severe pain in his left hip and mild paresthesias in the left leg. A blood count test showed the following: high White Blood Cell Count (WBC) of $17.5 \times 10^9/L$, normal hematocrit (Hct) 0.36. After initial evaluation, which included an X-ray, abdominal ultrasound and therapy, he was referred to the Center for Emergency Medicine by an ambulance.

The transport lasted 2.5 hours. Upon arrival he was given intravenous fluid Hydroxyethyl Starch (HES) 500ml and Ringers lactose 500 ml for hypotension (92/71). Laboratory analyses showed the following: high WBC $19.6 \times 10^9/L$, normal Hct 0.379, serum lactate dehydrogenase level (LDH) 557, U/L. After intravenous infusion his blood pressure improved.

The patient complained of a severe pain in the left hip and left buttock, and left leg paresthesias. Physical examination showed that the patient's left hip and left buttock were swollen and firm on palpation. At the time the active movement of his left leg was reduced, distal circulation of the left leg was normal, dorsalis pedis artery and posterior tibial artery were

palpable. A compartment syndrome of the left gluteal region was suspected.

An additional X-ray was performed which showed fracture of the inferior pubic ramus, and fractures of transverse processes of the lumbar spine from L1 to L4 but without spinal stenosis. A computed tomography (CT) scan of the abdomen with contrast and abdominal ultrasound showed a small amount of free fluid in the Morrison's pouch with no signs of internal bleeding. A lumbar and pelvis CT scan confirmed the already established X-ray diagnosis, i.e. undisplaced fracture of the inferior ramus of the pubis and fractures of transverse processes of the lumbar spine from L1 to L4.

Given that the CT scan did not show significant signs of bleeding, surgeons believed that the patient should be put under observation and monitoring, and that a CT angiography of the pelvic region should be performed.

The patient was treated at the Emergency Department of the Intensive Care Unit. The patient's condition slightly improved after analgesia and cold compresses. Blood count test was performed every 4 hours. Hemoglobin (Hgb) level and Hct slightly decreased over time and the serum level of creatine kinase (CK) increased to 8616 U/L (12 hours after the injury). The left buttock continued to increase in size and was firm. The pain was more severe than on arrival. At the time the complete numbness of the left leg developed and distally active moves of the left hip could not be performed. We suspected that this condition could only be caused by gradual and progressive compression on the sciatic nerve, most probably by hematoma located in the gluteal region.

Therefore, computerized tomographic (CT) angiography was performed 14 hours after admission and it showed post-traumatic pseudoaneurysm of the superior gluteal artery surrounded by hematoma (Figure 1-3). The size of pseudoaneurysm was 16x28 mm and it was located in the left gluteal region. We considered arterial emobilization as a preoperative treatment, but low blood count and the general condition of the patient indicated an urgent surgical treatment.

Thirty minutes before the surgical treatment laboratory findings were the following: Hgb 105 g/L, Hct 0.306, enormously high levels of creatine kinase 13799 U/L (refer-

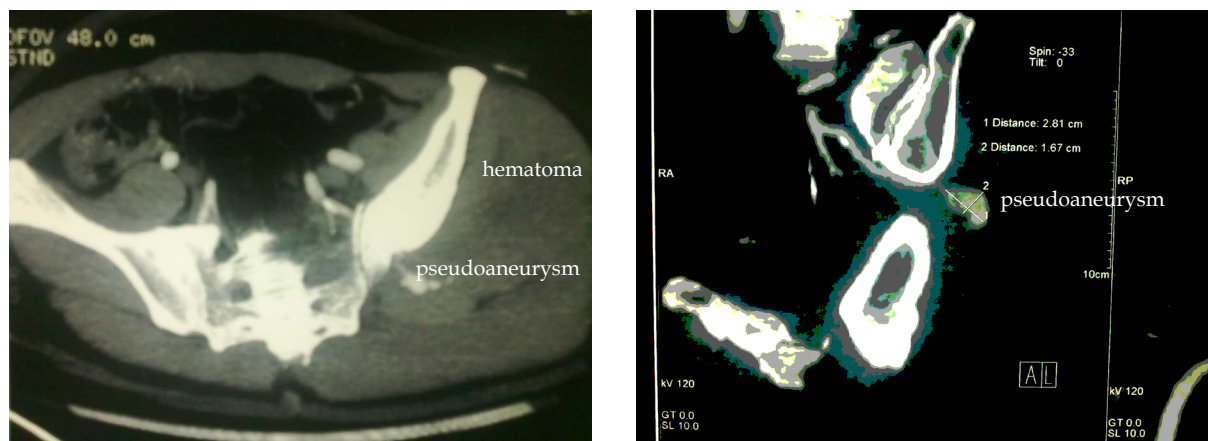


Figure 1. Computerized tomographic angiography: post-traumatic pseudoaneurysm of superior gluteal artery surrounded by hematoma



Figure 2. Computerized tomography: Lateral view of posttraumatic pseudoaneurysm of superior gluteal artery

ence range 0-205 U/L), high LDH 464 U/L (reference range 125-243 U/L). Just before the fasciotomy began, the Hbg level was 89.7 g/L, and a very low level of Hct 0.26 was registered.

The first stage of the surgical treatment was a retroperitoneal approach for pelvic blood vessels and after the internal iliac artery was ligated, the second stage was undertaken. Incision was a standard posterior approach to the hip. Following the fasciotomy, a large hematoma was detected below the gluteus maximus muscle the size of approx. 12x7x4 cm (Figure 4). After evacuation of the hematoma, the sciatic nerve was identified, which was intact and obviously compressed by the hematoma. Sur-

rounding muscles were affected by the same hematoma, with pale gray color, contractility in $\frac{1}{3}$ of the gluteus maximus muscle, with soft and mushy consistency (Figure 5).

Afterwards, the superior gluteal artery was identified, ruptured along the longitudinal axis and ligated 2 cm proximal to the rupture. Wide muscle debridement was necessary. The wound was copiously irrigated and closed for next local inspection with only a few subcutaneous and cutaneous sutures. During the surgery the patient received seven units of blood. The total time between the injury and fasciotomy was 25 hours.

The patient's hemodynamic status was supported by intravenous infusions, followed by blood transfusions. Six hours after the surgical treatment laboratory findings showed that the level of Hct was very low - 0.25, the level of creatine kinase was very high - 14190 U/L, and high LDH - 451 (U/l). In the next two days the level of Hct slightly improved and was 0.27 (L/L), and level of creatine kinase was significantly better (6832 U/L), LDH was 292 U/L, CRP was 224.9, mg/L. On day three, the level of CK was 5410 U/L, CRP was 183.7 mg/L and Hct was significantly improved to 0.335.

On the fourth postoperative day, local inspection of the wound showed marginal muscle necrosis, and re-debridement was performed. The function of the sciatic nerve improved significantly during the postoperative care. On the second postoperative day the patient started to perform dorsal and plantar flexion, and flexion and extension of toes. On day five the patient walked with crutches for the first time, supported by a physiotherapist.



Figure 3. Large hematoma below gluteus maximus muscle

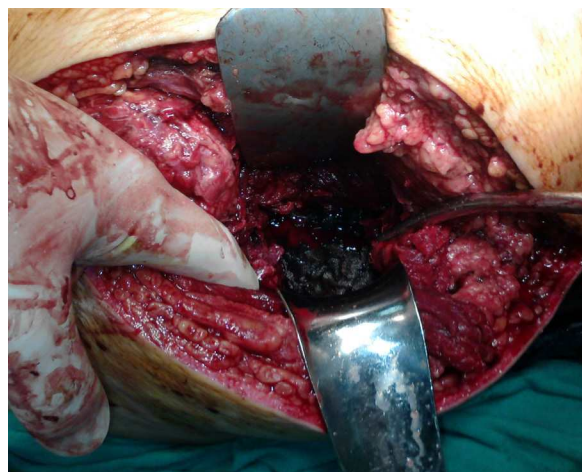


Figure 4. Altered gluteus maximus muscle color and consistency

Seven days after the injury, his condition and hemodynamic status were stable and he was transferred to a less intensively monitored unit.

Discussion

Compartment syndrome is an increased soft tissue pressure within the enclosed soft tissue compartment of the extremity, leading to devastating muscle necrosis, contracture, functional impairment and nerve damage [6]. Gluteal compartment syndrome as a result of fall or trauma has rarely been reported. It is mostly associated with drug overdose, alcohol intoxication and prolonged immobilization [7].

In this case, the patient had suffered injury in a rural area. He was initially treated at a local hospital where adequate diagnostic procedures could not be performed. He was transported by an ambulance and reached the Center for Emergency Medicine six hours after the injury, which in this case could have been fatal.

A compartment syndrome of the left gluteal region was suspected due to rigidity and neurological disorder of the left leg. Arterial embolization was considered as a preoperative treatment, but low blood count and the general condition of the patient required urgent surgical treatment.

In order to make decompression of the sciatic nerve, two-stage surgery was required. The first stage involved ligating the internal iliac artery that would prevent fatal arterial bleeding and the second stage involved fasciotomy and decompression of the sciatic nerve

and muscles.

A similar case occurred in the 1980s in Hannover, Germany, when the patient had gluteal compartment syndrome caused by rupture of the superior gluteal artery, without fracture of the pelvis [8]. The patient had neuromuscular disorders of the leg. Despite the obvious need for an emergency decompressive fasciotomy of the buttock, the doctors believed that arteriography of the pelvic region, and possibly arterial embolization should be done first, because of the possibility that the releasing of hematoma in the buttock might lead to uncontrolled arterial bleeding. A pelvic arteriogram demonstrated a rupture of the left superior gluteal artery at the level of the sciatic notch. After embolization, they did fasciotomy without debridement. The total time between the injury and fasciotomy was 7.5 hours [8].

Gluteal compartment syndrome is a very rare syndrome. On the basis of our case and review of the literature, gluteal compartment syndrome must be considered as a serious complication of pelvic trauma, which might lead to fatal outcome [1-3,6-10]. The main stage of the treatment relates to prompt diagnosis and early surgery [10]. Urgent surgical treatment – fasciotomy should be done as soon as possible [1-5]. CT angiography of the pelvis should be considered prior to fasciotomy [10]. In the case of bleeding, preoperative embolization should be performed as an adjuvant treatment to surgery in patients with fair condition. Signs of sciatic nerve compression occur frequently and rhabdomyolysis may be associated with the syndrome [12]. This leads to a conclusion

that the surgical team should consist of an experienced traumatologist, vascular surgeon, radiologist and anesthesiologist.

Conclusion

Traumatic gluteal compartment syndrome is a

rare condition. Gluteal compartment syndrome should be taken into consideration in each patient with pelvic trauma and hematoma in the gluteal region whose neurological status is affected. Prompt diagnosis and fasciotomy are crucial in the treatment.

The authors declare no conflicts of interest.
Autori izjavljuju da nemaju sukob interesa.

References

- Garner MR, Taylor SA, Gausden E, et al. Compartment syndrome: diagnosis, management, and unique concerns in the twenty-first century. *HSS J* 2014;10(2):143–52.
- Mubarak SJ, Hargens AR. Compartment syndromes and Volkmann's contractures. Philadelphia: W.B. Saunders Company; 1981; p. 1–6.
- Smith A, Chitre V, Deo H. Acute gluteal compartment syndrome: superior gluteal artery rupture following a low energy injury. *BMJ Case Rep* 2012 Dec 17; 2012. pii: bcr2012007710. doi: 10.1136/bcr-2012-007710.
- Matsen FA. Compartmental Syndromes. New York: Grune & Stratton; 1980. p. 101–15.
- Hill SL, Bianchi J. The gluteal compartment syndrome. *Am Surg* 1997;63(9):823–6.
- Roberts CS, Gorczyca JT, Ring D, Pugh KJ. Diagnosis and treatment of less common compartment syndromes of the upper and lower extremities: current evidence and best practices. *Instr Course Lect* 2011;60:43–50.
- Echtermeyer V, Oestern HJ. Compartment syndrome. Etiology, physiopathology, localization, diagnosis, therapy. *Hefte Unfallheilkd* 1983;162:75–96.
- Keene GS, Robinson AHN, Bowditch MG, Edwards DJ. Compartment syndrome. In: *Key Topics in Orthopaedic Trauma Surgery*. Oxford, UK: Bios Scientific Publishers; 1999; p. 41–2.
- Mustafa NM, Hyun A, Kuma JS, Yekkirala L. Gluteal compartment syndrome, A case report. *Cases J* 2009;2:190.
- Brumback RJ. Traumatic rupture of the superior gluteal artery, without fracture of the pelvis, causing compartment syndrome of the buttock. A case report. *J Bone Joint Surg Am* 1990;72:134–7.
- Prynn WL, Kates DE, Pollack CV Jr. Gluteal compartment syndrome. *Ann Emerg Med* 1994;24(6):1180–3.
- Hayden G, Leung M, Leong J. Gluteal compartment syndrome. *ANZ J Surg* 2006;76(7):668–70.

Glutealni kompartment sindrom kao posljedica traumatske rupture gornje glutealne arterije

Đemil Omerović¹, Ismet Gavrankapetanović¹, Faris Gavrankapetanović¹,
Amel Hadžimehmedagić², Faruk Lazović¹

¹Klinika za ortopediju i traumatologiju, Univerzitetski klinički centar Sarajevo, Sarajevo, Bosna i Hercegovina

²Centar za srce, Univerzitetski klinički centar Sarajevo, Sarajevo, Bosna i Hercegovina

Uvod. Opisan je slučaj glutealnog kompartment sindroma nastalog kao posljedica traumatske rupture *arteriae glutealis superior* udružene sa prelomom donjeg ramusa pubične kosti nastalih usljed pada sa visine.

Prikaz slučaja. Muškarac, 60 godina, zadobio je povrede nastale padom sa visine od četiri metra. Tri sata nakon povrede razvili su se znaci glutealnog kompartment sindroma i kompresije *nervus ischiadicus-a*. Urađena je kompjuterizovana tomografija (CT) sa kontrastom koja je pokazala prisustvo hematoma u glutealnoj regiji, ali bez znakova aktivnog krvarenja. Nakon opservacije pacijenta urađena je CT angiografija kojom je potvrđena ruptura *a. glutealis superior*. Odmah potom je urađena fasciotomija i debridment rane. U postoperativnom toku došlo je do značajnog poboljšanja stanja pacijenta.

Zaključak. Traumatski glutealni sindrom je rijetko stanje. Glutealni sindrom treba uzeti u obzir kod svakog pacijenta koji je zadobio prelom karličnih kostiju, sa prisutnim glutealnim hematomom i neurološkim deficitom. Brza i adekvatna dijagnostika i fasciotomija su od krucijalne važnosti, jer je fasciotomija zlatni standard u tretmanu kompartment sindroma.

Ključne riječi: glutealni kompartment sindrom, trauma karlice, ruptura *a. glutealis superior*