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Inferior gluteal artery pseudoaneurysm related to intramuscular injection

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ABSTRACT

INTRODUCTION: Gluteal artery pseudoaneurysms are rare, yet the most common in cases involving the superior gluteal artery. Pseudoaneurysms of the inferior gluteal artery are uncommon and are often related to blunt or penetrating trauma, infections and fractures of the pelvis.
PRESENTATION OF CASE: The authors present a case of pseudoaneurysm of the inferior gluteal artery related to an iatrogenic injury due to intramuscular injection of medication, which was treated with selective embolization of the artery during angiography.
DISCUSSION: The most common manifestation of an inferior gluteal artery pseudoaneurysm is the presence of a painful mass in the buttock that may or may not be associated with neurological symptoms due to compression of the sciatic nerve. Ultrasound with color Doppler and computerized tomography with multi-detectors are useful non-invasive tools for diagnosis. However, both diagnosis and therapy are facilitated by catheter angiography.
CONCLUSION: This case cautions that although pseudoaneurysms are rare, pseudoaneurysms of the inferior gluteal artery require a high index of suspicion and careful physical examination by the physician in order to avoid misdiagnosis. It also illustrates the usefulness of a minimally invasive modality for treatment of these lesions.

1. Introduction

Pseudoaneurysms of the gluteal artery are rare and account for less than 1% of all pseudoaneurysms. They are more common in the superior gluteal artery (SGA) than in the inferior gluteal artery (IGA).[1] In 17 reports of IGA pseudoaneurysms in the past three decades, the causes ranged from blunt or penetrating trauma, infection, fractures of the pelvis or iatrogenic injury during surgical procedures on the pelvis or hips.[1–6] We describe a case of pseudoaneurysm of the IGA following intramuscular injection of medication in the buttock. Our report highlights the importance of considering arterial pseudoaneurysms in the differential diagnosis of post-traumatic swelling in the gluteal region, and we review the relevant literature.

2. Presentation of case

56-Year-old male was admitted urgently with intense pain in the right buttock, after the intramuscular injection twenty days previously of a dose of benzylpenicillin. On clinical examination the right buttock was swollen, hard and painful with a pulsating mass centrally. The skin over the lower outer quadrant of the right buttock was necrotic and discharging serosal fluid; the right lower limb was weak. A pseudoaneurysm of the gluteal artery was suspected, due to the intramuscular injection, causing compression of the sciatic nerve. Diagnostic angiography confirmed a pseudoaneurysm of the IGA (Fig. 1). The internal iliac artery was catheterized and the IGA selectively embolized with Gianturco coils (Cook Inc., Bloomington, USA; Fig. 2). As a second stage, the hematoma was drained and the cavity debrided (Fig. 3). Although this improved the patient's pain, he had no neurological improvement one year after surgery.

3. Discussion

A pseudoaneurysm is caused by rupture of an arterial wall. As a result of normal arterial pressure, blood within the lumen of the

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Table 1
Characteristics of cases of pseudoaneurysm of the inferior gluteal artery published in the English language in the last 25 years.

Author (date)	Time between the lesion and the diagnosis (weeks)	Mechanism of the lesion	Signs and symptoms	Diagnostic examination	Treatment
Herber et al. (1988)[17]	388	Lesion because of firearm	Pain and pulsating edema in the gluteal region associated with neurological symptoms of the lower limb	MRI + angiography	Angiography and selective embolization of the IGA
Papadopoulos et al. (1989)[11]	0	Iatrogenic (Biopsy)	Pain and edema in the gluteal region associated with neurological problems of the lower limb	Intraoperatory	Proximal control of the iliac artery and ligature of the IGA by direct access
Bennett et al. (1992)[18]	24	Blunt trauma	Constipation and difficulty to urinate	CT and angiography	Angiography and selective embolization of the IGA
Hollandand and Ibach (1996)[13]	21	Perforating trauma	Edema and pulsating hematoma in the gluteal region associated with neurological symptoms of the lower limb	Angiography	Proximal control of the iliac artery and ligature of the IGA by direct access
Deshmukh et al. (2000)[5]	N/I	Infection	Pain in the right iliac fossa	CT, US doppler and angiography	Angiography and selective embolization of the IGA
Agarwal et al. (2003)[1]	5	Fracture of the pelvis	Pain and edema in the gluteal region associated with neurological problems of the lower limb	US doppler + angiography	Angiography and selective embolization of the IGA
	7	Fracture of the pelvis	Hypovolemic shock, pain and edema in the groin and neurological symptoms of the lower limb	Angiography	Angiography and selective embolization of the IGA
Kuzuya et al. (2005)[15]	N/I	No trauma history	Pain and edema in the gluteal region	CT + angiography	Embolization by direct puncture guided by ultrasound
Khera et al. (2006)[2]	11	Blunt trauma	Hypovolemic shock, edema in the gluteal region	US doppler	Angiography and selective embolization of the IGA
Singh et al. (2007)[4]	2	Perforating trauma	Fever, pain and edema in the gluteal region	US doppler + MRI	Angiography and selective embolization of the IGA
Aydin et al. (2007)[10]	13	Perforating trauma	Pain and edema in the gluteal region associated with neurological symptoms of the lower limb	Angiography	Ligature of the IGA by direct access
Nunoo-Mensah et al. (2007)[3]	1	Infection	Fever, hemorrhage	Angiography	Angiography and selective embolization of the IGA
Keeling et al. (2008)[12]	1	Blunt trauma	Hypovolemic shock, pain and hematoma in the gluteal region	CT + angiography	Angiography and selective embolization of the IGA
Juszkat et al. (2010)[19]	1	Blunt trauma	Gluteal and lumbar hematoma + anemia	US doppler + angiography	Angiography and selective embolization of the IGA
Bruno et al. (2011)[6]	4	Iatrogenic (arthroscopy)	Anemia, pain, edema in the gluteal region associated with neurological symptoms of the lower limb	Angiography	Angiography and selective embolization of the IGA
Mouawad et al. (2013)[14]	24	Blunt trauma	Pain and edema in the gluteal region	US doppler + angiography	Angiography and selective embolization of the IGA
Tsauo et al. (2013)[20]	1	Blunt trauma	Anemia, pain, edema and hematoma in the gluteal region associated with neurological symptoms of the lower limb	US doppler	Angiography and selective embolization of the IGA
Our case	3	Iatrogenic (intramuscular injection)	Pulsating edema, hematoma in the gluteal region associated with neurological symptoms of the lower limb	Physical examination and angiography	Angiography and selective embolization of the IGA

et al: and collaborators; N/I: not-informed; US: ultrasound; CT: computerized tomography; MRI: magnetic resonance imaging; IGA: inferior gluteal artery.

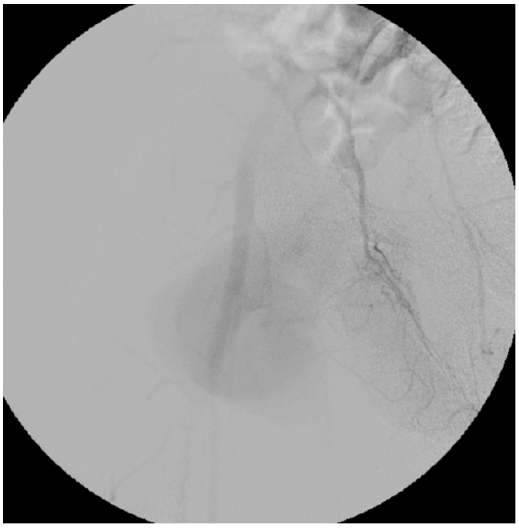

Fig. 1. Angiographic aspect of the pseudoaneurysm of the inferior gluteal artery.

Fig. 2. Final angiographic aspect after embolization with coils of the inferior gluteal artery.

Fig. 3. Post-embolization and pre-surgical aspect of the right buttock which showed an increased volume and hardened consistency. Progressive necrosis of the skin related to the rapid growth of the pseudoaneurysm and stretching of the skin.

artery seeps through the rupture in the vessel wall and into the surrounding soft tissue, forming a sac that directly communicates with the arterial lumen.[8] Pseudoaneurysms of the IGA are generally due to blunt or penetrating trauma, infections, fractures of the pelvis, or iatrogenic lesions during surgery of the hips or pelvis (Table 1).

In 1991, Vauthey et al.,[7] reported a case of pseudoaneurysm of the SGA related to an iatrogenic lesion due to intramuscular injection of medication. Although rare, this lesion may be explained by the anatomy of the SGA. However, the preferred location for an intramuscular gluteal injection avoids both the IGA and sciatic nerve. The IGA is the largest terminal branch of the anterior internal iliac trunk and mainly supplies the buttock and thigh. It descends before the sacral plexus and the piriformis muscle and after the internal pudendal artery. It then passes the primary and secondary anterior sacral spinal nerve branches, travels between the piriformis and ischiococcygeus muscles, and continues along the inferior part of the greater sciatic foramen to reach the gluteal area. As it extends downward toward the thigh, the artery runs with the sciatic nerve and the posterior cutaneous nerve to the thigh, between the greater trochanter and ischial tuberosity and beneath the gluteus maximus muscle. The lesion described in this case report would certainly not have occurred if the correct technique had been used for an intramuscular injection in the gluteal region; the proper technique involves an injection in the upper outer quadrant of the buttock.

The most common manifestation of an IGA aneurysm is the presence of a painful mass in the buttock, which may or may not be associated with neurological symptoms in the inferior, ipsilateral limb due to compression of the sciatic nerve by the mass effect of the pseudoaneurysm. The presence of anemia has been reported in only three previous cases, but it can provide important information for the differential diagnosis. Furthermore, the onset times for signs and symptoms of IGA pseudoaneurysm are quite variable: according to the literature, they may occur a few weeks, months, or even years after the initial trauma.[9] A delay in onset increases the likelihood of erroneously diagnosing other conditions, such as a gluteal abscess, sarcoma, lipoma, or hernia.[4,10,11] In at least two patients with an uncertain diagnosis who underwent an open surgical procedure to drain a putative abscess or hematoma, disastrous hemorrhage and shock developed intraoperatively.[4,10,12]

In the case herein reported, the diagnostic hypothesis of pseudoaneurysm of the IGA generated during physical examination was facilitated by the presence of a pulsating mass, a sign that was reported in only two previous cases.[13] This sign allowed the diagnosis to be confirmed by angiography and treatment of the lesion to be performed at the same time by selective embolization of the IGA.

The literature has shown that ultrasound (US) with color Doppler is extremely useful in showing the characteristics of flow within a pseudoaneurysm (Yin-Yang signs). Computerized tomography with multi-detectors (MDCT) can also be a useful non-invasive tool to diagnose vascular trauma. Both types of studies facilitate planning of precise endovascular treatment options, and they are particularly useful in aiding the diagnosis of pseudoaneurysm in the absence of definitive signs, such as the presence of a pulsating mass. However, catheter angiography facilitates both the diagnosis and treatment of an IGA pseudoaneurysm.[1,14]

Treatment options for peripheral pseudoaneurysms include surgery with arterial ligature, thrombin injection guided by US, embolization with coils by endovascular or percutaneous techniques guided by US,[15] fixation with an endoprosthesis,[16] or endovascular embolization with glue.[12] The choice of treatment depends on the size and location of the pseudoaneurysm, the clinical condition of the patient, and possibly the size of the neck of the pseudoaneurysm.[15] In our case, because of the associated clinical and neurological status of the patient, the choice was made to

occlude the IGA and drain the hematoma to reduce skin necrosis, alleviate pain, and increase the possibility of neurological improvement. The high flow of blood within the pseudoaneurysm noted during angiography suggested that embolization with glue would have little precision. Therefore, embolization with coils was chosen since it was the easiest, safest, and cheapest therapeutic option.

Similar to our case, almost all cases of IGA pseudoaneurysm reported after the year 2000 were treated successfully using endovascular selective embolization of the IGA. The only exceptions were those cases reported by Kuzuya et al.,[15] in 2005 and Aydin et al.,[10] in 2007. In the first case,[15] the authors reported that it was not technically possible to selectively catheterize the IGA. The authors then proposed percutaneous thrombin injections, which were unsuccessful. Finally, embolization with coils by means of direct puncturing guided by US was performed, which was successful in occluding the IGA. Of note, percutaneous thrombin injections were also found to be unsuccessful in another patient with an IGA pseudoaneurysm. In the second case,[10] the authors did not mention the reason for failure of the endovascular treatment.

The use of minimally invasive techniques, such as endovascular treatments, has certain advantages compared to traditional, open surgery: less bleeding, the need for only local anesthesia, avoidance of opening the retroperitoneum, lower risk of infection, improved post-surgery recovery time, and avoidance of sponge effects of the hematoma.[1]

4. Conclusion

This case cautions that although IGA pseudoaneurysms are rare, they require a high index of suspicion and careful physical examination by the physician in order to avoid misdiagnosis. This case also illustrates the usefulness of a minimally invasive modality for treatment of these lesions.

Conflict of interest

None declared.

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None declared.

Ethical approval

Written informed consent was obtained from the patients for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contributions

Paulo Fernandes Saad and Dinani Matoso Fialho de Oliveira Armstrong operated the patient, accompanied and reported the case; Karen Ruggeri Saad, Bruno Leonardo de Freitas Soares and Paulo Henrique Freitas de Almeida followed the case and did the literature review; Paulo Fernandes Saad, Karen Ruggeri Saad and Álvaro Razuk Filho wrote the manuscript. All the authors approved the final text.

References

1. Agarwal M, Giannoudis PV, Syed AA, Hinsche AF, Matthews SJ, Smith RM. Pseudoaneurysm of the inferior gluteal artery following polytrauma: diverse presentation of a dangerous complication: a report of two cases. *J Orthop Trauma* 2003;**17**:70–4.
2. Khera G, Shea JÁ, Parkinson R, Lambrianides AL. Delayed diagnosis of a gluteal pseudoaneurysm caused by blunt trauma: review of the literature and presentation of case report. *J Trauma* 2006;**60**:644–7.
3. Nunoo-Mensah JW, Ritter MP, Wasserberg N, Ortega A, Harrell D. Pseudoaneurysm of the inferior gluteal artery: an unusual complication after abdominoperineal resection for rectal cancer: report of a case. *Dis Colon Rectum* 2007;**50**:115–7.
4. Singh V, Sharma H, Maini L. Inferior gluteal artery pseudoaneurysm mimicking gluteal abscess. *Indian J Surg* 2007;**69**:257–9.
5. Deshmukh H, Prasad S, Pantankar T. Re: endovascular management of an inferior gluteal artery pseudoaneurysm secondary to tuberculous cold abscess. *Cardiovasc Intervent Radiol* 2000;**23**:80–2.
6. Bruno M, Longhino V, Sansone V. A catastrophic complication of hip arthroscopy. *Arthroscopy* 2011;**27**:1150–2.
7. Vauthey JN, Maddern GJ, Balsiger D, Blumgart LH, Triller J. Superselective embolization of superior gluteal artery pseudoaneurysms following intramuscular injection: case report. *J Trauma* 1991;**31**:1174–5.
8. Schwartz LB, Clark ET, Gewertz BL. Anastomotic and other pseudoaneurysms. In: Rutherford RB, editor. *Vascular surgery*. Philadelphia: WB Saunders; 2000. p. 752–63.
9. Culliford AT, Cukingham RA, Worth Jr MH. Aneurysms of the gluteal vessels: their etiology and management. *J Trauma* 1974;**14**:77–81.
10. Aydin A, Lee CC, Schultz E, Ackerman J. Traumatic inferior gluteal artery pseudoaneurysm: case report and review of literature. *Am J Emerg Med* 2007;**25**, 488.e1–e3.
11. Papadopoulos SM, McGillicuddy JE, Messina LM. Pseudoaneurysm of the inferior gluteal artery presenting as sciatic nerve compression. *Neurosurgery* 1989;**24**:926–8.
12. Keeling AN, Naughton PA, Leahy AL, Lee MJ. Traumatic inferior gluteal artery pseudoaneurysm and arteriovenous fistula managed with emergency transcatheter embolization. *Cardiovasc Intervent Radiol* 2008;**31**:S135–9.
13. Holland AJ, Ibach EG. False aneurysm of the inferior gluteal artery following penetrating buttock trauma: case report and review of the literature. *Cardiovasc Surg* 1996;**4**:841–3.
14. Mouawad NJ, Haurani MJ, Mason T, Satiani B. Delayed presentation and management of blunt traumatic inferior gluteal artery pseudoaneurysm with associated arteriovenous fistula. *Vasc Endovascular Surg* 2013;**47**:573–6.
15. Kuzuya A, Fujimoto K, Iyomasa S, Matsuda M. Transluminal coil embolization of an inferior gluteal artery aneurysm by ultrasound-guided direct puncture of the target vessel. *Eur J Vasc Endovasc Surg* 2005;**30**:130–2.
16. Roblin P, Alexiou T, Sabharwal T, Reidy J, Ross DA. Successful stent-graft placement for the treatment of a superior gluteal artery pseudoaneurysm in a patient following complex pelvic surgery. *Br J Radiol* 2007;**80**:e7–10.
17. Herber SC, Ajalat GM, Smith DC, Hinshaw Jr DB, Killeen Jr JD. Transcatheter embolization facilitating surgical management of a giant inferior gluteal artery pseudoaneurysm. *J Vasc Surg* 1988;**8**:716–20.
18. Bennett JD, Brown TC, Coates CF, MacKenzie D, Sweeney J. Pseudoaneurysm of the inferior gluteal artery. *Can Assoc Radiol J* 1992;**43**:296–8.
19. Juszkat R, Zieliński M, Wykretowicz M, Piekarek A, Majewski W. Traumatic inferior gluteal artery aneurysm managed with emergency transcatheter thrombin injection. *Cardiovasc Intervent Radiol* 2010;**33**:607–9.
20. Tsauo J, Yang D, Ma H, Li X. Traumatic inferior gluteal artery pseudoaneurysm with compressive neuropathy managed with endovascular embolization and surgery. *Cardiovasc Intervent Radiol* 2013;**25** [Epub ahead of print].