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 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.

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
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                                                | 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)     | 0                                                 | Iatrogenic (Biopsy)      | Pain and edema in the gluteal region associated with neurological problems of the lower limb | Intraoperative                           | Proximal control of the iliac artery and ligature of the IGA by direct access                      |
| Bennett et al. (1992)          | 24                                                | Blunt trauma             | Constipation and difficulty to urinate                                           | CT and angiography                       | Angiography and selective embolization of the IGA                                                  |
| Holland and Ibach (1996)       | 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)         | 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)          | 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 edema in the gluteal region associated with neurological symptoms of the lower limb | Angiography                              | Angiography and selective embolization of the IGA                                                  |
| Kuzuya et al. (2005)           | 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)            | 11                                                | Blunt trauma             | Hypovolemic shock, edema in the gluteal region                                  | US doppler                              | Angiography and selective embolization of the IGA                                                  |
| Singh et al. (2007)            | 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)            | 13                                                | Perforating trauma       | Pain and edema in the gluteal region associated with neurological symptoms of the lower limb | Angiography                              | Ligation of the IGA by direct access                                                               |
| Nunoo-Mensah et al. (2007)     | 1                                                 | Infection               | Fever, hemorrhage                                                               | Angiography                              | Angiography and selective embolization of the IGA                                                  |
| Keeling et al. (2008)          | 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)          | 1                                                 | Blunt trauma             | Gluteal and lumbar hematoma + anemia                                            | US doppler + angiography                 | Angiography and selective embolization of the IGA                                                  |
| Bruno et al. (2011)            | 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)          | 24                                                | Blunt trauma             | Pain and edema in the gluteal region                                             | US doppler + angiography                 | Angiography and selective embolization of the IGA                                                  |
| Tsauo et al. (2013)            | 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.
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. 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., 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. A delay in onset increases the likelihood of erroneously diagnosing other conditions, such as a gluteal abscess, sarcoma, lipoma, or hernia. 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.

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. 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.

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, fixation with an endoprosthesis, or endovascular embolization with glue. 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. 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 pseudoaneuysm 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 pseudoaneuysm 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 pseudoaneuysm. 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 pseudoaneuysms 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.

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