Iatrogenic pseudoaneurysm of inferior epigastric artery: not only a surgical complication

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ABSTRACT

A 77-year-old lady with a longstanding scleroderma, presented to the Emergency Department for a state of severe malnutrition and fluid dysphagia. On physical examination, she presented an abdominal palpable swelling, with an associated large, posterior ecchymosis. A pseudoaneurysm of the right inferior epigastric artery was diagnosed on a color Doppler ultrasound examination. After collegial discussion with the surgical and interventional-radiologist team, a percutaneous exclusion of the pseudoaneurysm through thrombin injection was successfully performed, and no complications were reported. After a thorough anamnestic record, the possible cause of the pseudoaneurysm was discovered: a few days before hospital admission the general practitioner did some intradermoclysis in the abdominal wall to hydrate the patient, damaging the inferior epigastric artery wall with subsequent development of the pseudoaneurysm. The patient completely recovered, returned home after two weeks in a subacute facility, and is awaiting evaluation for the scleroderma follow up from a rheumatologist.

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INTRODUCTION

Development of an inferior epigastric artery pseudoaneurysm (IEAP) is a rare but well-documented complication of abdominal wall procedures performed in the iliac region. Abdominal surgery is the most frequent cause of IEAP, mainly in wound closure and laparoscopic procedures.[1] In the present report, we describe a case of iatrogenic IEAP not likely related to surgical intervention.

CASE REPORT

A 77-year-old lady with a longstanding history of scleroderma with pulmonary, skin and esophageal involvement, presented to the Emergency Department for a state of severe malnutrition, fluid dysphagia, thoracic pain, and weight loss. The patient was hemodynamically stable, blood pressure was 110/80 mmHg, heart rate 80 bpm, SpO_2 on room air 94% and she was apyretic. At physical examination, the patient presented in very poor conditions, her weight was 42 kg with a body mass index of 15.6 kg/m^2. She also showed diffuse hypotrophy with limitation in walking and skin ulcers from loss of substance at the back of the feet bilaterally. The vesicular murmur was ubiquitously reduced with fine bibasal crackles. The abdomen was sunken and treatable but painful in the right lower quadrant where there was a tense-elastic, palpable swelling of about 40×50 mm, with an associated posterior-extending skin ecchymosis. The peristalsis was present, and a vascular murmur was

audible over the swelling mass. Blood test revealed a state of mild anemia with hemoglobin 11.9 g/dl. A color Doppler ultrasound (US) examination with a 5-12 MHz linear probe (iu22, Philips Healthcare, Amsterdam, the Netherlands) of the abdominal wall (Figure 1) was soon performed, showing a hyper-vascular nidus with the "yin-yang" sign (Supplementary Video 1), that was supplied by the right inferior epigastric artery (IEA). Spectral Doppler of the feeding vessel showed both forward and reverse flow, (i.e., the ''to-and-fro'' pattern) indicative of a pseudoaneurysm. The same day the patient underwent a contrast-enhanced computed tomography (CECT) of the abdomen (Figure 2) which confirmed the presence of a broken and replenished right IEAP, associated with a large hematoma of the abdominal wall. After a collegial discussion with the surgical and interventional-radiologist team, a percutaneous exclusion of the pseudoaneurysm through thrombin injection was chosen as the best treatment. The procedure was performed under US guidance (7-18 MHz linear probe - Aplio 500, Canon Medical Systems Corporation, Ōtawara, Tochigi, Japan) by an interventional radiologist (A.C.) after informed consent of the patient. After accurate disinfection, a 22-gouge Chiba needle (Chibell, Biopsybell, Mirandola, Modena, Italia) was advanced in the pseudoaneurysm sac and human plasma purified thrombin (500 UI/ml; Baxter, Deerfield, Illinois, US) was directly injected until a complete echo-structured appearance of the sac was obtained. Color Doppler US and Superb Microvascular Imaging (SMI) were used to assess the complete exclusion of the pseudoaneurysm and the correct patency of the feeding arterial vessel (Figure 3). The Chiba needle was then removed, and a compression dressing was performed. The procedure

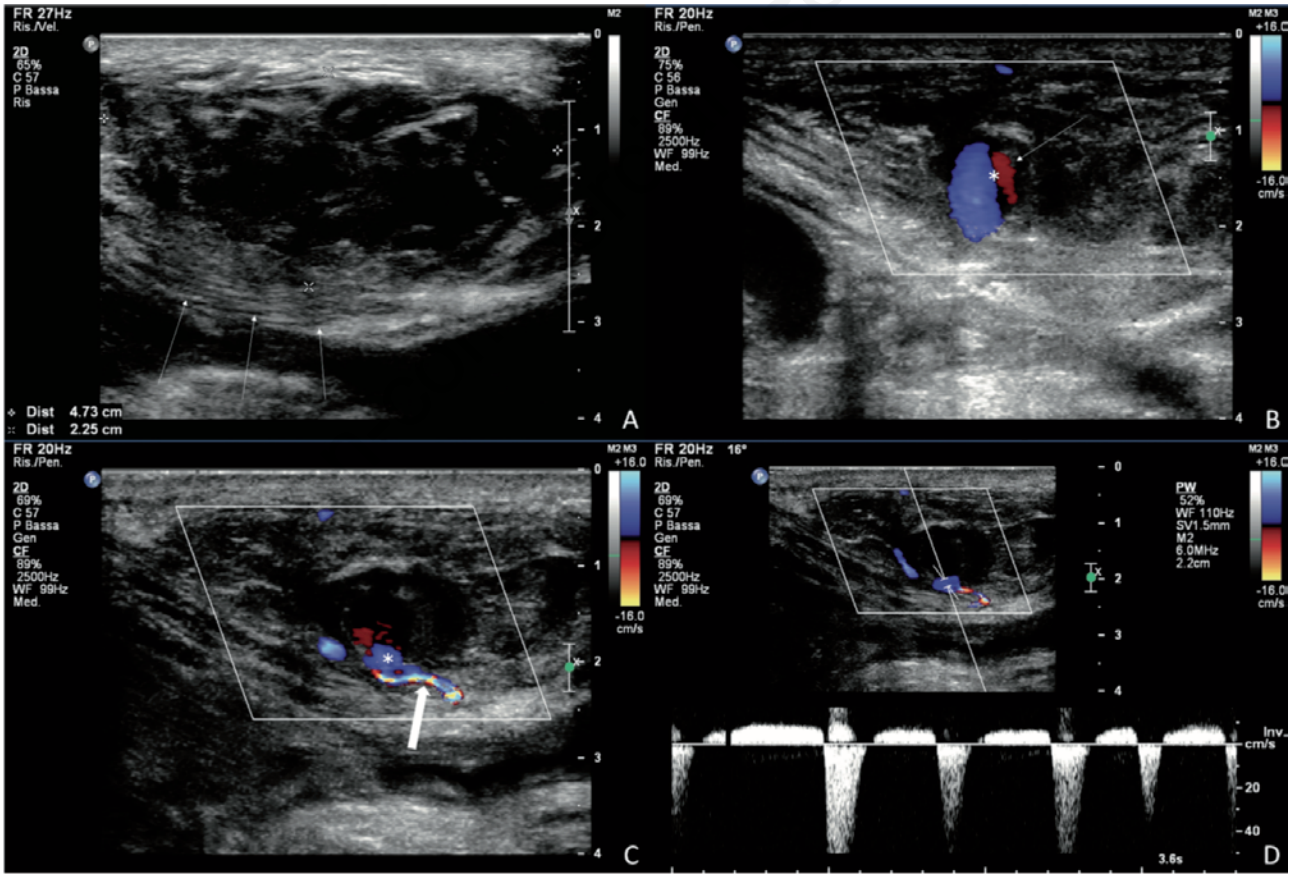

Figure 1. Ultrasound (US) examination with a 5-12 MHz linear probe (iu22, Philips Healthcare, Amsterdam, Netherlands) of the abdominal wall of a 77 years-old lady presenting with swelling at the right iliac fossa. A) B-mode US obtained at the swelling site demonstrates a 4.73×2.25 mm heterogeneous mass (dimension markers) in the right rectus abdominis muscle (arrows), which appear to be stretched by the mass. B) Color-Doppler US demonstrates a "yin-yang" sign (*) on the inside of an anechoic round structure (arrow, B-mode not showed) within the heterogeneous mass, consistent with a pseudoaneurysm surrounded by hematoma. C) Color-Doppler US demonstrates the adjoining arterial vessel (thick arrow) and the neck (*) of the pseudoaneurysm. D) Pulsed-Doppler at the pseudoaneurysm neck level demonstrates the classic "to and fro" pattern.

runs without complications. In the following days, the patient remained hemodynamically stable, with no evidence of anemia at blood tests. A 24h US control and a 10 days CECT documented the complete thrombosis of the pseudoaneurysm. Day by day the abdominal mass gradually reduced in size, with consensual resorption of the hematoma and reduction of abdominal pain. Thanks to a careful anamnestic record we eventually find the

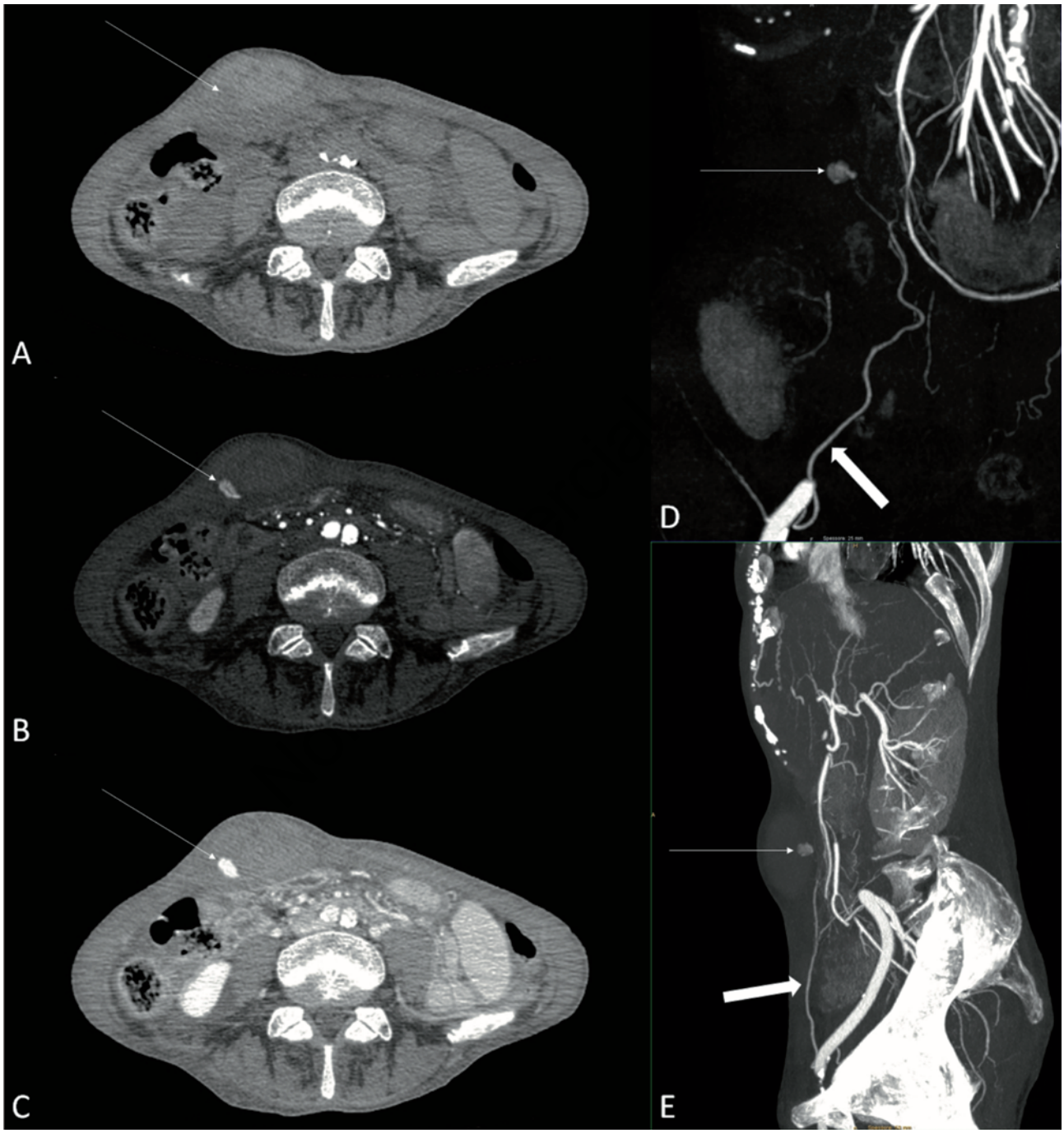

Figure 2. 64-row Computer Tomography Angiography examination (Revolution EVO, GE Medical Systems, Chicago, Illinois, USA). Pre-contrast (A), angiographic (B), and portal-venous (C) phase confirms the presence of the pseudoaneurysm (arrow). Coronal (D) and sagittal (E) maximum intensity projection reformation demonstrates that the feeding arterial vessel of the pseudoaneurysm (thin arrow) is a branch of the epigastric artery (thick arrow).

probable cause of the pseudoaneurysm: a few days before hospital admission the general practitioner did some intradermoclysis in the abdominal wall to hydrate the patient, thus damaging the wall of the IEA triggering the pseudoaneurysm to develop. In the following days, the patient underwent percutaneous endoscopic gastrostomy and started enteral nutrition. Before the discharge, the patient was evaluated by the rheumatologist who contraindicated the use of prostaglandins that the patient usually took for the scleroderma in consideration of the complication linked to the pseudoaneurysm. After the discharge she was admitted to a subacute facility where she continued and implemented enteral nutrition and started the physiotherapy with a gradual improvement of her physical condition. After two weeks she returned to home; she is now waiting for a revaluation from the rheumatologist for the possible reintroduction of the prostaglandins.

DISCUSSION

The IEA usually originates from the external iliac artery at a point cranial to the inguinal ligament. It pierces the transversalis fascia, runs across the transverse abdominis muscle, and ascends between the rectus muscle and the posterior rectus sheath. The anatomical position of the IEA subjects it to the risk of injury during abdominal procedures that are close to the artery.[2] A review of the literature performed in 2014,[1] shows how IEAP is a rare event (only 32 cases have been reported worldwide in the last 40 years). Abdominal surgery is by far the most frequent cause (20 out of 32 cases), mainly wound closure and laparoscopic procedures. Furthermore, rare cases of an IEAP have been described following therapeutic paracentesis of ascites, percutaneous vascular procedures, trauma or following Tenckhoff catheter removal.[3] Spontaneous IEAP is extremely rare: a single case has been described

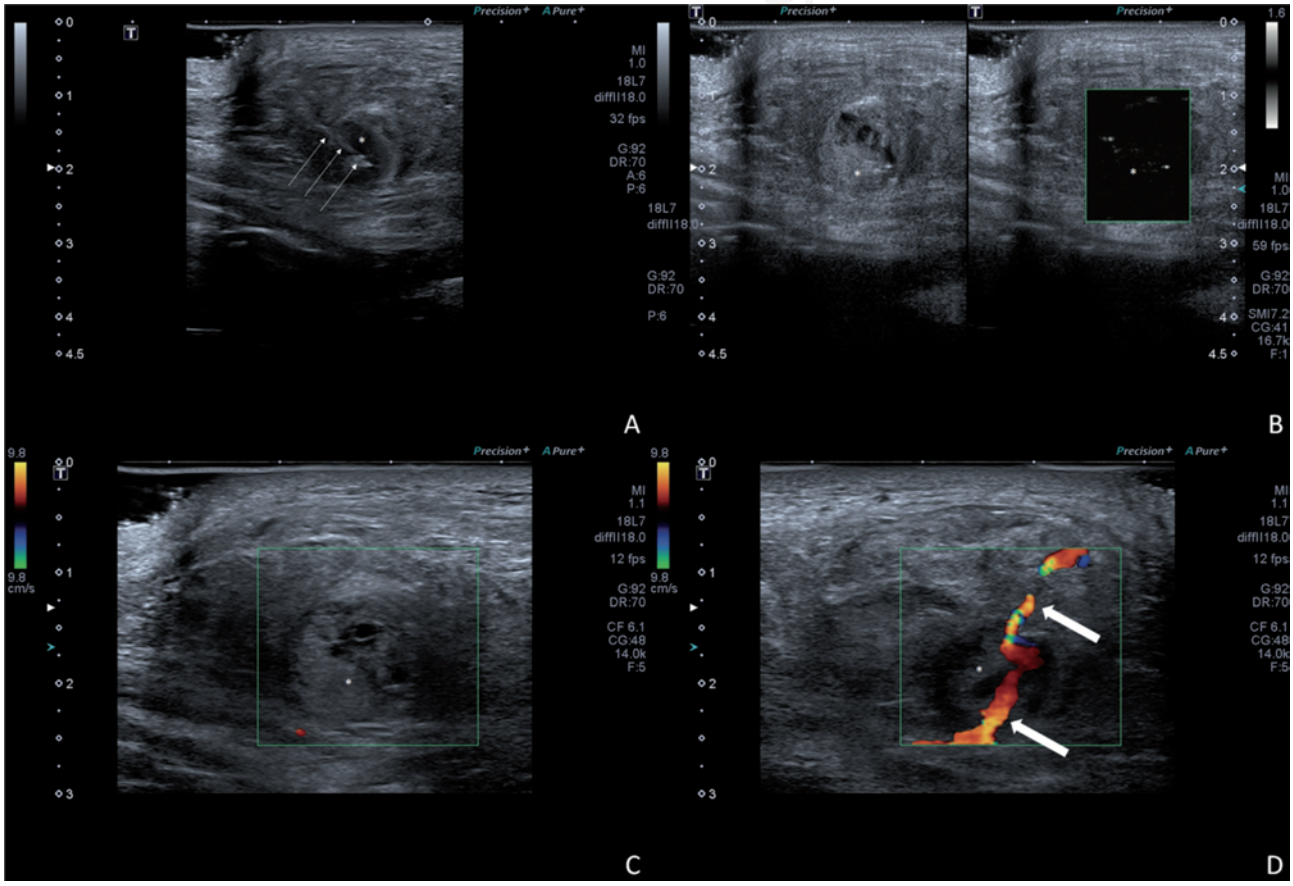

Figure 3. Ultrasound (US) guided percutaneous embolization of the pseudoaneurysm, with a 7-18 MHz linear probe (Aplio 500, Canon Medical Systems Corporation, Ōtawara, Tochigi, Japan). In image (A), a 22-gouge needle (thin arrows) is advanced in the pseudoaneurysm (*) and thrombin was injected in the sac. Subsequent controls with b-mode US (B, left-side), Superb Microvascular Imaging (SMI) (B, right-side), and color-Doppler US (C) demonstrates echostructured appearance of the pseudoaneurysm sac (*); neither SMI nor color-Doppler show any vascular signal within the sac (*). In image D, the preserved feeding vessel (thick arrows) can be seen adjoining the thrombosed the pseudoaneurysm sac (*).

in the literature in which the wall of the pseudoaneurysm was analyzed histologically with evidence of myxoid changes within it but in the absence of signs of inflammation.[4] In our clinical case, we suppose IEAP has an iatrogenic genesis but interestingly, not related to any surgical act. To our knowledge, there is no prior description of IAEP related to intradermoclysis in the abdominal wall. For the diagnostic work-up of the pseudoaneurysm, color Doppler US is a good imaging method with a sensitivity and specificity of 100% in differentiating false aneurysms from periarterial hematomas,[5] allowing non-invasive evaluation of such a mass. On b-mode US, a pseudoaneurysm is easily displayed as an outpouching of the feeding vessel. Due to the turbulent forward and backward flow, a characteristic yin-yang sign may be seen on color flow while a "to-and-fro" pattern may be seen with pulsed Doppler (Figure 1 and Supplementary Video 1). However, there is not a definitive imaging modality of choice: in our case, we did firstly an US exam, faster and more easily performed, and then a CECT to obtain a more detailed anatomic map useful in terms of treatment planning. The treatment of IEAP is wide-ranging:[5] traditionally, the management of pseudoaneurysms has been surgical ligation and excision. Percutaneous coil embolization is an alternative, more common in small lesions. Other possible techniques are US-guided compression repair – used especially in the initial management of iatrogenic pseudoaneurysm of the femoral and radial artery – and percutaneous US-guided thrombin injection. In our case, after collegial discussion, the last treatment option was chosen considering the technique feasible and simple to perform, relatively safe (the complications are rare) and very effective. US is also an excellent method for intra- and post-procedural monitoring during percutaneous embolization. In fact, it is able to detect even very slow flows that can persist after a percutaneous embolization, especially if auxiliary techniques such as Color- or Power-Doppler, contrast-enhanced US, or SMI are used. SMI is a recently developed ultrasound imaging technique that filters the signal originating from tissue movement, enabling selection and analysis of both high-speed and low-speed flows with high image resolution with an elevated frame rate (>50 fps). SMI is less susceptible to motion artifact rather than conventional color and power-Doppler imaging and requires neither contrast media administration nor ionizing radiations.[6]

CONCLUSIONS

IEAP is a rare but well-documented complication of abdominal procedures performed across the abdominal wall. Even if surgery is the most frequent cause of pseudoaneurysm development, this complication should be suspected after any kind of procedure performed in the iliac region. In conclusion, in our case the most probable cause of the pseudoaneurysm is intradermoclysis, as the patient did not undergo any other abdominal procedures and spontaneous IEAP is only anecdotal in literature.

Moreover, our experience underlines the primary role of multimodality imaging and collegial discussion in making early diagnosis and performing the correct treatment.

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