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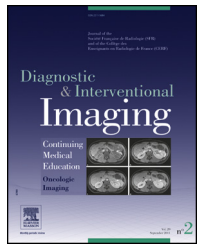

CONTINUING EDUCATION PROGRAM: FOCUS...

Spontaneous soft tissue hematomas

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KEYWORDS
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Abstract Spontaneous muscle hematomas are a common and serious complication of anticoagulant treatment. The incidence of this event has increased along with the rise in the number of patients receiving anticoagulants. Radiological management is both diagnostic and interventional. Computed tomography angiography (CTA) is the main tool for the detection of hemorrhage to obtain a positive, topographic diagnosis and determine the severity. Detection of an active leak of contrast material during the arterial or venous phase is an indication for the use of arterial embolization. In addition, the interventional radiological procedure can be planned with CTA. Arterial embolization of the pedicles that are the source of the bleeding is an effective technique. The rate of technical and clinical success is 90% and 86%, respectively.

Abbreviations: CTA, computed tomography angiography; SMH, spontaneous muscle hematomas; IEA, inferior epigastric arteries; SEA, superior epigastric arteries; CIA, ascending circumflex iliac arteries; LA, lumbar arteries; ILA, iliolumbar arteries; HAS, Haute Autorité de santé [French National Authority for Health].

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Background

Definition

Spontaneous muscle hematomas (SMH) are defined by the occurrence of extravasation of blood in a muscle group, most often in the abdominal waist. These hematomas can remain localized in the muscle head when they are contained by the fascia, or can diffuse into the peritoneal or retroperitoneal space [1]. SMH are not associated with trauma and are mainly located in the iliopsoas muscles and the rectus sheath of the anterior abdominal wall. Although it is a common, often benign pathology SMH can suddenly deteriorate and become life-threatening for patients.

Role of anticoagulants

The development of SMH is significantly associated with anticoagulant treatment, especially in the elderly [2—4]. The morbidity and mortality induced by these drugs is the leading cause of iatrogenic complications in France. One percent of the French population is on long-term anticoagulant treatment. Hemorrhagic complications from these treatments (all causes combined) occur in an estimated 5% of patients. The overall annual mortality from severe coagulant-induced hemorrhages is 0.65% [5,6]. The regular increase in the prescription of anticoagulants and platelet antiaggregants is probably largely responsible for the increase in the incidence of SMH [7—9]. The incidence of SMH in patients on anticoagulants is 0.6%. The prevalence of SMH is higher in women and elderly patients [6,8,9].

Factors of severity

Although it is a common entity, the factors of severity for SMH are not well known. To date, there are no criteria to distinguish non-severe SMH from those that may cause sudden deterioration of the patient's clinical condition and become life-threatening. Nevertheless, the radiologist plays a central role in the diagnostic and interventional management of this disease.

SMH are a single clinical entity with two categories:

- small hematomas are the most common. They can be found intramuscularly or extramuscularly but remain contained in the fascia. These hematomas resolve spontaneously and conservative treatment is indicated [8,10];
- voluminous hematomas are less frequent (Fig. 1a—b). They occur in at risk situations, and can result in hemodynamic instability. They can even be life-threatening, especially if the patient is fragile [8]. In this case bleeding is abundant with an active arterial leak of contrast material and selective embolization is indicated.

Physiopathology

The physiopathology of SMH is complex. It is based on a multifactorial microangiopathy [8]. The risk factors include hemostatic disorders, age, atheromatosis, vascular lesions from chronic arterial hypertension, and especially diabetes [3,11,12]. Furthermore, a genuine anticoagulant-induced immune microangiopathy has been reported to be a predisposing factor [11]. The occurrence of SMH is often associated with a microtrauma (closed glottis straining, isometric muscle contractions). This microtrauma could cause muscle and capillary tears which result in SMH [8,10]. Table 1 summarizes the known risk factors of SMH [13].

Anatomy

Vascular arterial anatomy

SMH mainly occur in three anatomical regions:

- there are 4 anterior abdominal wall muscles per side: the rectus, the external oblique, the internal oblique, and the transverse muscle. Vascularization of this muscle group is mainly provided by the deep inferior epigastric arteries (IEA), the superior epigastric arteries (SEA) and the deep circumflex iliac arteries (CIA). Fig. 1 shows the origin of the IEA and CIA located in relation to the inguinal ligament, where the external iliac artery becomes the common femoral artery. The IEA reaches the posterior aspect of the rectus muscle where they join the SEA coming from the internal thoracic arteries. The route of the first branch of the IEA, emerging near its origin, is primarily intrapelvic, anastomosing with the artery of the round ligament in women, or with the external pudendal artery in men (Fig. 2). The CIA pass along the iliac bone (Fig. 3a and b) ensuring vascularization of the external oblique, internal oblique, and transverse muscles as well as the iliac head of the iliopsoas;
- there are 3 posterior muscles per side: the iliac, the psoas, and the erector spinae muscles. These muscles are vascularized by the lumbar arteries (LA) and the iliolumbar arteries (ILA) (Fig. 3a and b). The ILA is the first ascending branch of the posterior gluteal trunk of the internal iliac artery that becomes the superior gluteal artery further on;
- there are 5 buttock muscles per side: the 3 gluteal muscles, the piriformis and the internal obturators. This muscle group is vascularized by the superior and inferior gluteal arteries, which are the terminal branches of the posterior trunk of the internal iliac artery (Fig. 4a and b).

Topographic anatomy

There is a transition zone, located at the junction of the medial and inferior third of the rectus muscles, made up of the arcuate ligament. At this point, the posterior sheath of the rectus muscles becomes anterior. The posterior aspect is now only covered by the transversalis fascia, which is not highly resistant. This is why SMH that occur above the

Table 1 Risk factors of spontaneous muscle hematoma.

Known risk factors [6—8,10,28]
Chronic renal insufficiency and hemodialysis
Cardiac, hepatic insufficiency
AHT
Closed glottis straining
Coagulation disorders
Degenerative muscle diseases
Congenital collagen diseases