

## Ultrasound and Computed Tomography Findings of Fat Embolism

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**Section:** Cardiovascular

**Area of Interest:** Vascular Veins / Vena cava

**Procedure:** eLearning

**Procedure:** Contrast agent-intravenous

**Imaging Technique:** Ultrasound

**Imaging Technique:** CT

**Special Focus:** Embolism / Thrombosis Case Type: Clinical Cases

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**Patient:** 67 years, female

### Clinical History:

A 67-year-old woman was admitted with multiple traumas due to a high impact vehicle accident. She had right lower limb and head pain. On her physical examination, there were swellings and skin abrasions on the right proximal calf and scalp; there was also abdominal tenderness.

### Imaging Findings:

The patient underwent head, extremity and contrast enhanced thoracic-abdominal computed tomography (CT). Right tibia plateau fracture was seen. In addition, there were liver lacerations and brain contusions. There was hypo-dense tissue, whose density was -78 HU, in the right femoral and right external iliac vein lumens on her abdominal CT (Figure 1). The soft tissue which surrounds these veins had heterogeneous density. Because of fat density tissue inside the femoral and external iliac vein, the patient underwent ultrasonography (US) to investigate these veins. There was 4mm of hyper-echoic material, which was moving and rolling slowly in the right femoral vein lumen (Figure 2). The patient had no respiratory or neurological compliments and there was no embolic fat tissue in the pulmonary circulation in clinical progress. Internal fixation was applied for tibial fracture and optimal hydration and oxygenation were done. In follow up, fat embolism syndrome (FES) did not occur.

### Discussion:

Fat embolism refers to the presence of fat globules in the peripheral and pulmonary circulation. FES occurs due to fat emboli and consists of respiratory problems, cerebral abnormalities and petechial skin eruptions. This syndrome manifests 24–72 hours after especially traumatic bone fractures and also major burns, pancreatitis, blood transfusion, liposuction and haemoglobinopathy [1, 2].

Patients with large bone fractures can have fat embolisation of up to 90% but most of them are asymptomatic. 3-4% of them can proceed to FES and severe FES has mortality rates of up to 20% [3-5]. FES is mediated by mechanical obstruction and biochemical injury. Fat cells in the circulation have pro-inflammatory and pro-thrombotic potential so they facilitate thrombosis. Also massive fat emboli can obstruct vascular lumen itself. Biochemical injury occurs due to pro-inflammatory cytokines, free fatty acids and free radicals which are associated with tissue damage [6].

The treatment procedure aims normo-oxygenation and normo-volemia. Because of this, oxygen is given to

normalize the level of arterial oxygen and hydration for normal blood pressure. Steroids can be helpful but there are not enough studies to prove their positive effect. Heparin is found to be ineffective [6].

The radiologic findings of fat emboli in vascular system are rare. On CT Images, hypo-dense fat globules can be seen in the vascular lumen. On US, hyperechoic fat globules and also their movement can be seen. Small globules are located in the nondependent side of the lumen because of fat tissue density. In contrast to venous thrombus, fat embolus has a spherical shape, is non-obstructive and the vein which has fat embolus can be compressible [7].

While evaluating trauma patients radiologic procedures, vascular structures should be examined for fat emboli and patients should be followed up for FES.

**Differential Diagnosis List:** Fat embolism, Venous thrombosis, Vascular trauma

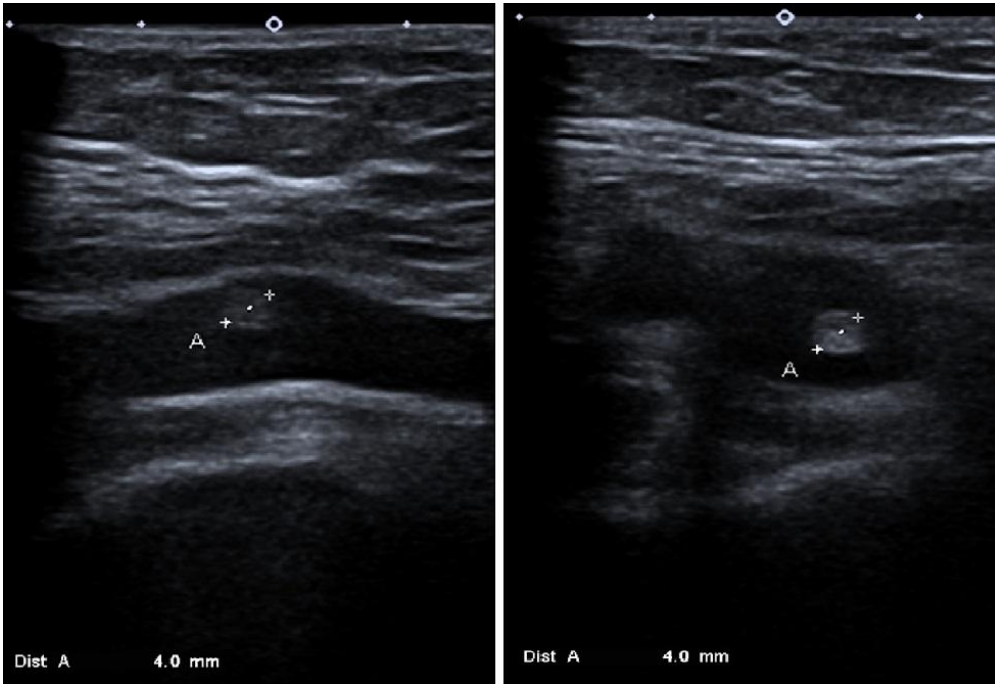
**Final Diagnosis:** Fat embolism

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**Figure 1**

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**Description:** 4mm of hyperechoic material in the right femoral vein lumen. **Origin:** Cilengir AH, Department of Radiology, Izmir Katip Celebi University Ataturk Training and Research Hospital, Izmir, Turkey.

**Figure 2**

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**Description:** A hypodense tissue in the right femoral and right external iliac vein lumens. **Origin:** Cilengir AH, Department of Radiology, Izmir Katip Celebi University Ataturk Training and Research Hospital, Izmir, Turkey.