

Background

An 82 year old female presents to the Emergency Department with left lower extremity swelling and discomfort that began earlier that day. A lower extremity venous ultrasound was performed that showed lack of flow, compressibility, and lack of normal augmentation in the common femoral vein, profunda femoris, superficial femoral vein, and popliteal vein of the left leg compatible with extensive acute deep venous thrombosis (DVT). She was assessed by vascular team and felt to be a good candidate for acute DVT thrombectomy given the acute, mostly hypoechoic appearance of the plaque on ultrasound. She subsequently underwent a left femoral vein thrombectomy, however, given her anaphylactic allergy to contrast the procedure was performed with carbon dioxide acting as a negative contrast agent.

Upon her follow-up in clinic two weeks after the procedure, she stated that she was doing well and her left leg was symptom free.

References

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2. Zannoli, Romano & Bianchini, David & Rossi, Pier Luca & Caridi, James & Corazza, Ivan. (2016). Understanding the basic concepts of CO2 angiography. *Journal of Applied Physics.* 120. 194904. 10.1063/1.4968170.
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Imaging



Figure 1



Figure 2



Figure 3

Digital Subtraction Angiography using CO2 demonstrates extensive filling defect involving the proximal femoral veins with extension to the popliteal vein (**Figure 1**). The Clotriever device was utilized and, over four passes, the underlying clot producing filling defects on angiography were removed (angiography on **Figure 2** and gross specimen of removed clot on **Figure 3**).

Discussion

Carbon dioxide (CO2) angiography can be used as a safe alternative to iodinated contrast, particularly in situations where there is an allergy to conventional contrast or fear or nephrotoxicity. CO2 is expelled through the lungs and rapidly removed from the body by normal breathing.

There is currently only one FDA-approved CO2 delivery system designed for use for angiography. This device is made up of only two components: a high pressure CO2 reservoir and a low pressure valve. The reservoir can hold up to 10,000 mL of CO2 and be used over potentially hundreds of angiographies, which in part makes it the most affordable/least expensive contrast that can be utilized.

One drawback of CO2 arteriography is that it is still not recommended for injection above the diaphragm due to risk of cerebral air embolism via a right to left cardiopulmonary shunt or from reflux within a carotid or vertebral artery to the brain. It is, however, in appropriate cases a safe alternative to other contrast agents.

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