

## Case Report

# Force CTA and post-processing techniques play an important role in preoperative diagnosis of limb arteriovenous fistula

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**Abstract:** Arteriovenous fistula (AVF) refers to an abnormal pathway between the arteries and veins, and is seen in the extremities. This is a rare congenital left lower extremity arteriovenous fistula with multiple deformities. CTA examination and all kinds of post-processing and reconstruction techniques of CT clearly showed left lower extremity arteriovenous fistula and deformity, multiple hemangioma, and pseudoaneurysm at the left thigh root of a 28-year-old female patient. Under the guidance of DSA, the patient received the method of embolization of spring coil. However, the diffuse congenital arteriovenous fistula (CAVF) is easy to relapse and the patient should be followed up closely. Therefore, CTA and CT post-processing technology is of great value in preoperative diagnosis and postoperative evaluation of CAVF.

**Keywords:** Arteriovenous, fistulas, lower limb, CTA, DSA

### Introduction

Arteriovenous fistula (AVF) refers to an abnormal pathway between the arteries and veins, and is seen in the extremities. This is a report of a 28-year-old female patient, with an egg sized lump in about her groin detected 20 days earlier. The patient was diagnosed with congenital arteriovenous fistula (CAVF) and the formation of multiple aneurysms by CTA examination and several post-processing techniques. We report that the patient received the latest generation of double-source force CT examination, mainly focusing on the good display effect of CT post treatment technology.

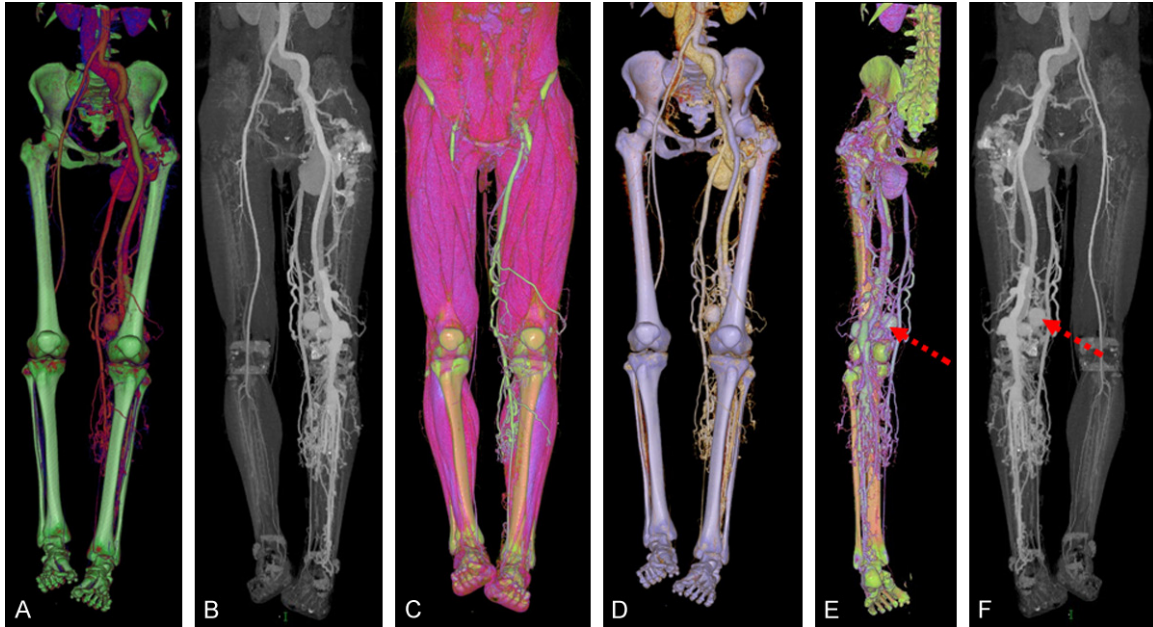
### Case report

A 28-year-old female patient, with an egg sized lump in about her groin from 20 days prior to visiting the clinic, presented herself for a check-up. It was found in physical examination that her left leg was shorter than the right leg by 2 cm. Laboratory examination was otherwise unremarkable. The CTA examination was required to scan the lower extremities.

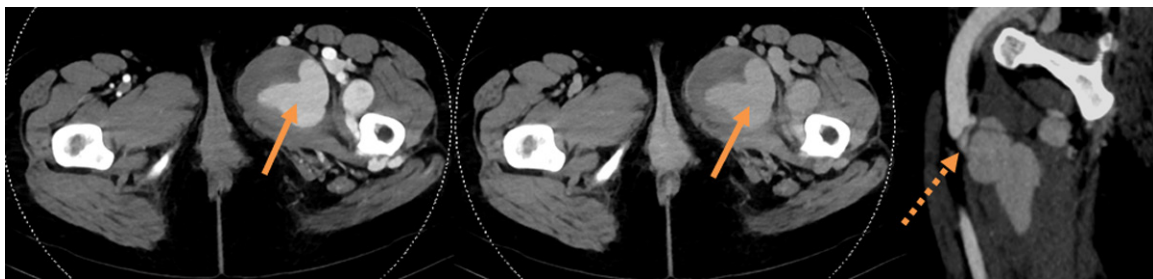
Extensive and abnormal blood vessels of the left lower extremities were found by CTA examination (**Figure 1A, 1B**): CPR images revealed a lump, connecting the left femoral artery by the branch of the small vessel, measuring 71 × 72 mm in size in the left groin (**Figure 2**); VR images showed the swelling of the left lower extremities, which was about 1 cm longer than the opposite side (**Figure 1C, 1D**); MIP images found that the left lower limb artery had multiple cystic processes, the largest of which was in the popliteal fossa, measuring the size of about 25 × 41 mm (**Figure 1E, 1F**). Additionally, left lower extremity vein imaging identified percutaneous transluminal vascular malocclusion, because it was diagnosed as a left lower extremity arteriovenous fistula and deformity, with multiple hemangioma and pseudoaneurysms at the left thigh root.

### Discussion

Arteriovenous fistula (AVF) refers to an abnormal pathway between the arteries and veins, with two types of congenital and acquired types in the extremities. Congenital arteriovenous fis-



**Figure 1.** A, B. Left lower extremity arteriovenous with increased thickening, and multiple vascular tortuosity group; C, D. Left lower limb swelling and length which was about 1 cm longer than the right; E, F. (P-A position) Left lower limb multiple aneurysms, the largest in the popliteal fossa (arrows).

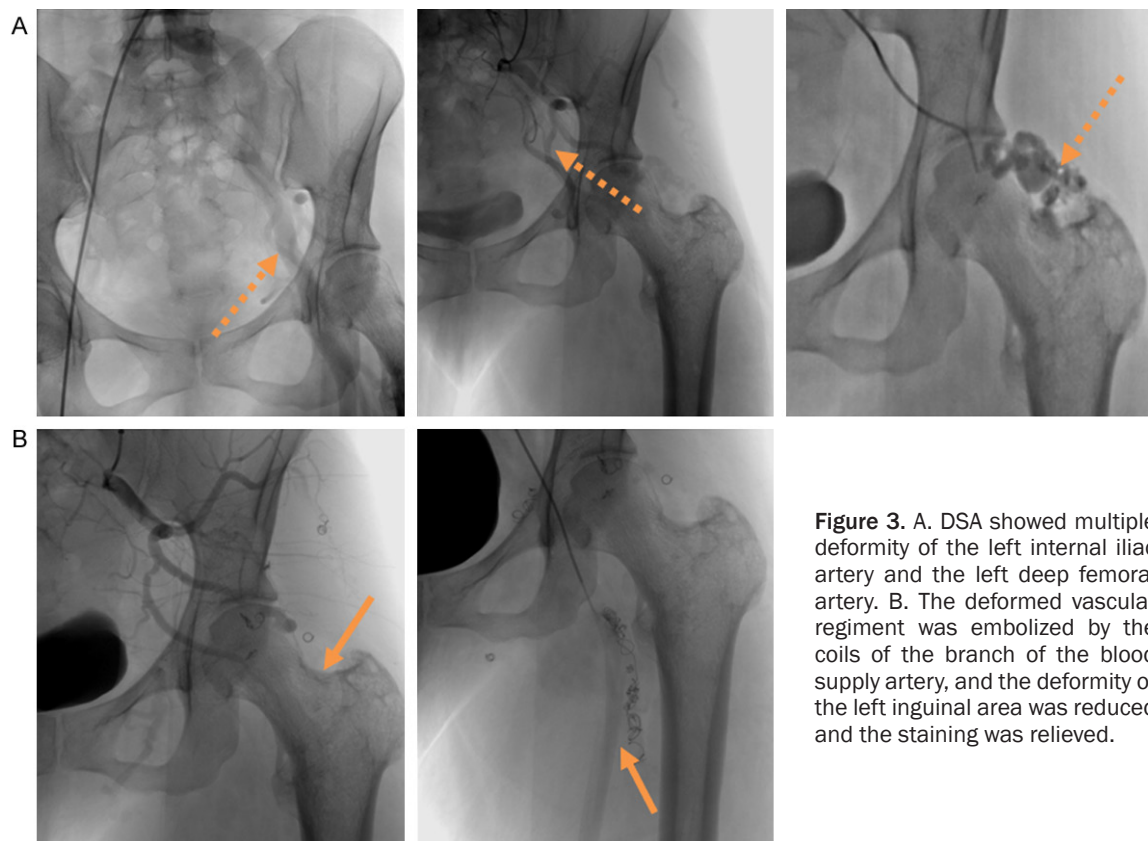


**Figure 2.** Pseudoaneurysm of the left femoral artery was about 71 mm × 72 mm, with a high density in the center and low density around the rim. CPR showed clearly the neck of the tumor and its diameter of about 4 mm (arrow).

tula (CAVF) is due to the lack of closure of the original plexiform structure in the second stage of embryonic development, including localized type and diffuse type, while acquired by trauma, especially through perforating injury and iatrogenic injury [1]. This case is a congenital diffuse arteriovenous fistula with multiple aneurysms, arteriovenous malformations and varicose veins.

Traditional arteriography is considered as the gold standard for vascular examination [2], but it is not as good as the wide application of ultrasound and CTA examination because of its invasive examination. Ultrasonography showed left femoral artery pseudoaneurysm and left lower extremity arteriovenous fistula in this case, but

the small fistula could be ignored. However, CTA examination accurately showed the location, size and number of fistula, and the morphology of proximal and distal artery of fistula. CTA with SOMATOM force, the latest generation of dual source CT scanner, was used to provide an ultra fast scan and low radiation dose to get all data that can be used for post-vascular treatment, including maximum density projection (MIP), volume reproduction (VR), and curved planar reformation (CPR). In this case of CAVF, MIP (**Figure 1B, 1F**) showed the entire expansion of blood vessels- multiple aneurysms and femoral artery pseudoaneurysm. VR (**Figure 1A, 1C-E**) provides spatial relationship with the surrounding tissue of the real 3D image display- the vascular malformation of left lower limb



**Figure 3.** A. DSA showed multiple deformity of the left internal iliac artery and the left deep femoral artery. B. The deformed vascular regiment was embolized by the coils of the branch of the blood supply artery, and the deformity of the left inguinal area was reduced and the staining was relieved.

swelling and tortuous large and CPR (**Figure 2**) in two-dimensional image displayed form of the arbitrary plane-the fistula and tumor size.

AVF should be treated as early as possible because it can cause heart failure due to an increase in the amount of heart blood [3, 4]. Various methods of treatment of vascular lesions [5], but the treatment of CAVF is mainly performed by operation and interventional embolization. The localized CAVF is mostly located at the distal limb of the limb and is mainly performed by surgical resection. In this case, the left internal iliac artery and the left deep femoral artery were divided into branches of the blood supply artery. Under the guidance of DSA, 22 MWCE spring coils were used to embolize the arteries of the above malformed vessels. Angiographic study showed that the deformed blood vessels in the left inguinal area decreased and the local aneurysm dyed light (**Figure 3A, 3B**). However, diffuse CAVF is easy to relapse. The method of phased embolization was used in this case, a large number of malformed vessels involving a wide range and varying degrees. This case should be followed up closely.

In conclusion, CTA and CT post-processing technology is of great value in pre-operative diagnosis and post-operative evaluation of CAVF [5]. It plays an important role in interventional therapy.

#### Disclosure of conflict of interest

None.

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## CTA diagnostic value of lower extremity arteriovenous fistula

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