

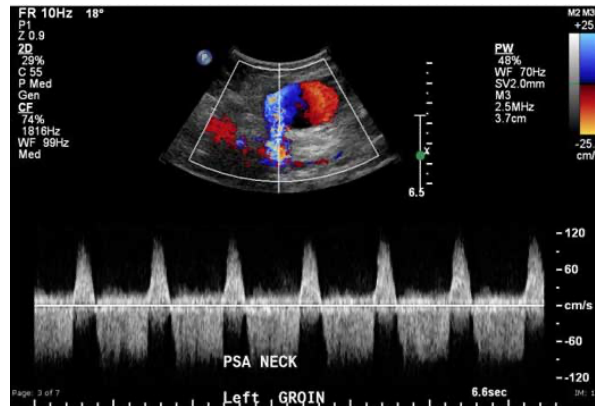
**PSEUDOANEURYSM / AV FISTULA CRITERIA**

**A. Pseudoaneurysm**

1. Visible, intraluminal swirling turbulent flow is present within the mass that is connected to the native artery by a neck that has bidirectional, or to and fro flow.

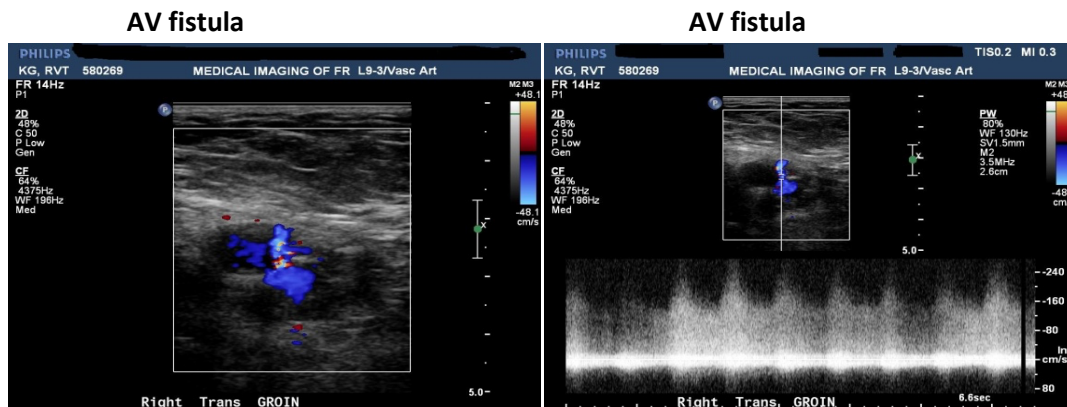
This is characterized by reversal of flow in the neck during diastole, due to changes in pressure gradients. In systole, the pressure is higher on the arterial end, thus blood flows into the pseudoaneurysm. During diastole, the pressure is now higher in the pseudoaneurysm, due to wall forces in the aneurysm sac secondary to distension and decreased arterial pressure. This phenomenon leads to a cyclical change in flow through the neck between systole and diastole, as seen in the image below.

2. Thrombus may or may not be present.



**B. Arteriovenous fistula**

1. A significant pressure gradient will result in a focal area of significantly increased velocity at the site of the AVF with flow directed from the artery to the vein. Color Doppler imaging of AVFs will often demonstrate a bruit artifact and/or a thrill may be palpable.
2. Spectral Doppler analysis of the affected vein central to the AVF will demonstrate “arterialized flow” with pulsations during systole and a lack of respiratory phasicity
3. Spectral Doppler analysis of the affected artery above the AVF may demonstrate a mono-phasic continuous waveform with elevated systolic and diastolic velocities. Flow in the injured artery distal to the AVF will generally have normal pulsatility.



- C. Hematoma - Localized collection of blood outside the blood vessels.
1. Mass which is Doppler silent. Hypoechoic mass\* without blood flow.
  2. Variable echo density, ill-defined or invisible margins.
  3. Incompressible with inability to induce any fluid movement.

\* The distribution of the internal echoes compare with the age of the hematoma.

Homogenously clotted blood typically has no internal echoes. Generally, a hematoma that is less than 30 days contain significantly fewer echoes than those >30 days old. Septations are usually seen within the first 30 days, then disappear. Hematomas are generally ovoid or spherical in shape.

References:

1. Femoral Artery Closure After Cardiac Catheterization; Wallace J. Hamel, RN, BSN, MSN
2. Ultrasound Features of AV fistula; Nanda Venkatanarasimha and Simon Freeman
3. Iatrogenic Femoral Pseudoaneurysms: Thrombin Injection after Failed US-guided Compression; David P. Brophy, MD, et al. January 2000 Radiology, 214, 278-282
4. Treatment of Iatrogenic Femoral Pseudoaneurysms with Percutaneous Thrombin Injection: Experience in 54 Patients; Robert G. Sheiman, MD. April 2001 Radiology, 219, 123-127.
5. Thrombin injections for pseudoaneurysms (IPG60) Interventional procedures. IPG60. Issued: June 2004.
6. Sonoworld; Daniel Merton