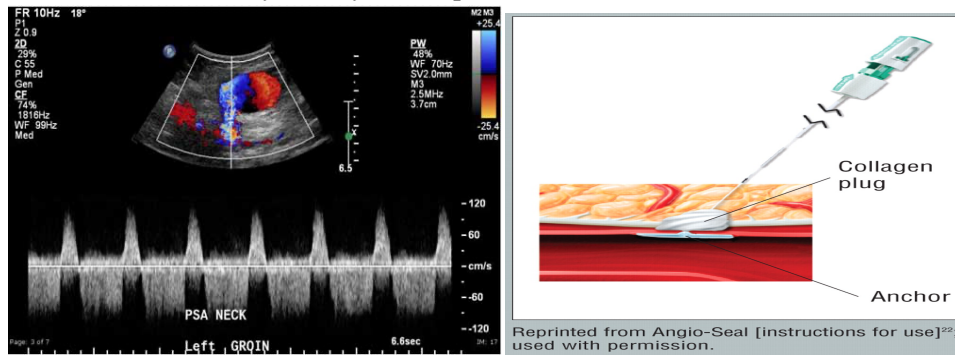


PSEUDOANEURYSM / AV FISTULA EDUCATION

Pseudoaneurysm is a dilation of an artery caused by damage to one or more layers of the artery as a result of arterial trauma or rupture of a true aneurysm. Also known as false aneurysm.

Visible, intraluminal swirling turbulent flow is seen 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. Thrombus may or may not be present.

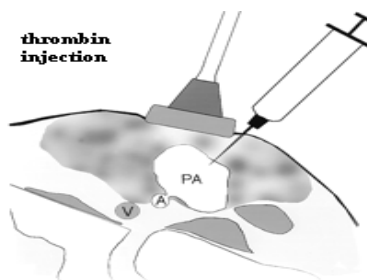


Pseudoaneurysm and AV fistula may occur following procedures that involve puncture of an artery, removal of an arterial blood pressure line or intra-aortic balloon pump, or following accidental trauma.

An Angio-seal may be placed to close the arteriotomy site. The Angio-Seal device is made up of 3 components: a specially designed polymer anchor, an absorbable collagen sponge, and an absorbable self-tightening suture. All 3 components dissolve in 60 to 90 days. The sponge is positioned in the puncture track outside the artery wall by a pulley system created by the anchor and suture. The device seals and sandwiches the arteriotomy between the anchor and the collagen plug. The collagen not only acts as a plug at the puncture site but also stimulates thrombus formation and platelet aggregation.

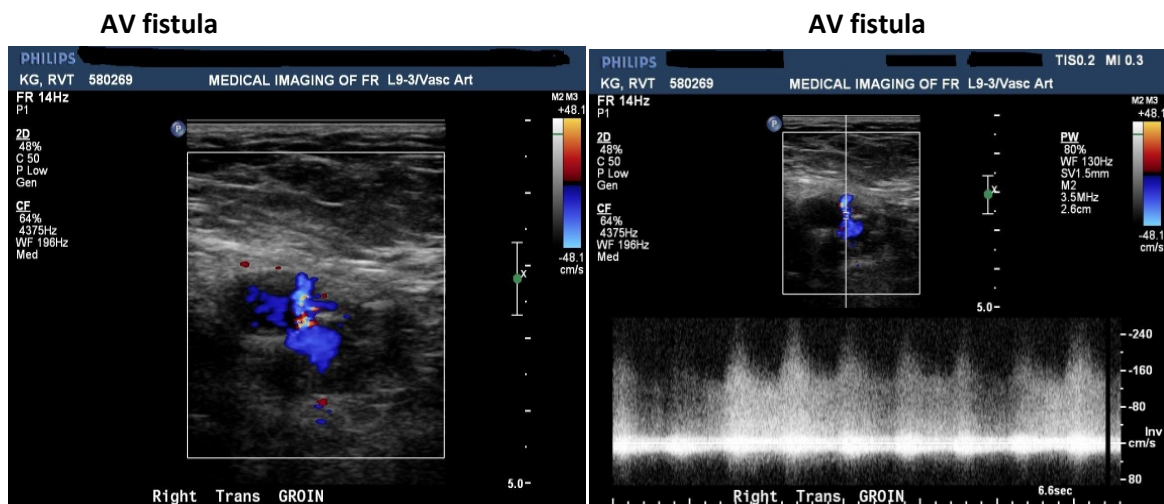
Treatment options:

- Ultrasound guided thrombin injection. Thrombin, a chemical that stimulates clotting, is injected into the pseudoaneurysm. The pseudoaneurysm clots off and is no longer at risk of expanding or rupturing. Also, normal blood flow within the artery is maintained. However, it cannot be used if the patient has an "arteriovenous fistula," which is an abnormal connection between an artery and a vein. This is because the injected thrombin, instead of staying within the pseudoaneurysm cavity, could leak into the venous system. 10% of patients with a pseudoaneurysm also have an arteriovenous fistula.



Arteriovenous fistula is an abnormal connection or pathway between an artery & a vein.

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.



Hematoma is a 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

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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