

ULTRASOUND GUIDED COMPRESSION REPAIR, A SUCCESSFUL MODALITY IN THE TREATMENT OF FEMORAL ARTERY PSEUDO ANEURYSM

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ABSTRACT:

Femoral Artery Pseudoaneurysm (FAP) is a known complication that occurs in 0.1% to 0.2% of diagnostic angiograms and 0.8% to 2.2% following interventional procedures. Surgical repair has been the main modality of treatment of FAP. We report here a 68 year old male patient who developed a FAP following a Percutaneous

Transluminal Coronary Angioplasty (PTCA), managed conservatively by the noninvasive ultrasound guided compression repair (UGCR). Also this patient was continued on his antiplatelet drugs and heparin during this entire period.

Keywords: Femoral artery, Pseudoaneurysm, Cardiac catheterization

INTRODUCTION:

The femoral artery pseudoaneurysm (FAP) is a troublesome groin complication related to the femoral arterial access site used for invasive cardiovascular procedures (1). FAP occurs in 0.1% to 0.2% of diagnostic angiograms and 0.8% to 2.2% following interventional procedures (2). The incidence of FAP has recently increased with the more frequent use of thrombolytics, antiplatelet agents, anticoagulants, and larger-sized cannulas for interventional procedures (1). Iatrogenic pseudoaneurysms (IPA) form when an arterial puncture site fails to seal, allowing arterial blood to jet into the surrounding tissues and form a pulsatile hematoma (3). These lesions lack a fibrous wall and are contained by a surrounding shell of hematoma and the overlying soft tissues. It can present as a new thrill or bruit, pulsatile hematoma, or marked pain or tenderness. Complications of pseudoaneurysms include rupture, distal embolization, local pain, neuropathy and local skin ischemia (3). We report here a 68 year old male patient who developed a FAP following a Percutaneous Transluminal Coronary Angioplasty (PTCA), managed conservatively by the noninvasive ultrasound guided compression repair (UGCR).

Case Summary:

A 68 year old male patient, with a background history of coronary artery disease with an old anterior myocardial infarction in July 2006, Coronary Artery Bypass Grafting (CABG) done on 18 th August 2006, was admitted and treated at an outside hospital for acute coronary syndrome in the last week of November 2007. An angiogram done during this time showed a triple vessel

disease. Hence, he was referred to our tertiary care center for Percutaneous Transluminal Coronary Angioplasty (PTCA). His admission labs were within normal limits and his coagulation workup was normal (Table 1). He underwent PTCA on 30th November 2007 to Left Main Coronary Artery (LMCA) and distal circumflex coronary arteries. After 3 days of uneventful post procedure period, the patient complained of pain and swelling in the right groin. On examination, there was a warm and pulsatile mass lesion in the right femoral region. An arterial Doppler of the right groin showed a small pseudoaneurysm with a narrow neck at the origin of right superficial femoral artery with right groin hematoma. (Figure 1).

Table 1 : Admission laboratory values as on 29th Nov. 2007

Hemoglobin	13 g/dl
Total count	6900 / mm ³
Serum creatinine	0.9 mg/dl
International normalized ratio (INR)	1.12
Platelet count	3.5 lakhs/mm ³
Bleeding time	2 min and 45 sec
Clotting time	4 min and 30 sec

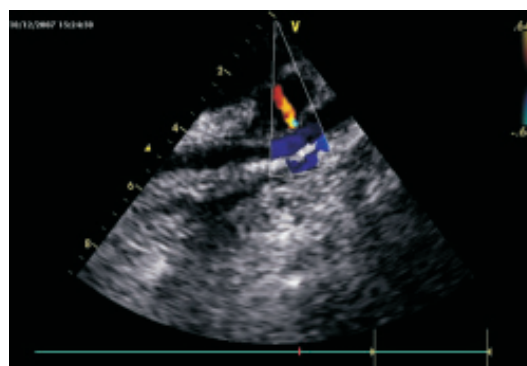


Figure 1 : Arterial Doppler of right groin small pseudoaneurysm with a narrow neck

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The patient was on the antiplatelet agent, low dose aspirin 75mg in addition to low molecular weight heparin (enoxaparin 60mg twice a day subcutaneous injection). These medications were continued and the patient was taken up for Ultrasound guided compression repair (UGCR). This procedure was done in two sittings, a week apart. During each of these procedures a strong compression was applied for nearly 30 minutes at the neck of the pseudoaneurysm and a repeat Doppler was done after each procedure to evaluate the morphology of the pseudoaneurysm following ultrasound guided compression. After the second sitting the patient had good pseudoaneurysm closure and there was absent color flow into the aneurysmal cavity. (Figure 2) During this entire period the patient was continued on low dose aspirin, heparin and other cardiac medications. His post procedure period was uneventful and was discharged on the 3 day after the 2nd procedure. He is on regular follow up since then.

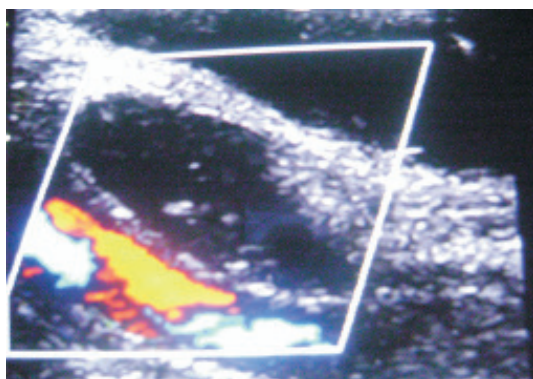


Fig. 2: Repeat arterial Doppler showing absence of blood flow into the aneurysmal sac.

DISCUSSION:

Duplex scanning, along with pulsed and color Doppler flow mapping has been the mainstay in diagnosing FAP. Criteria used to diagnose a pseudoaneurysm include: swirling color flow seen in a mass separate from the affected artery, color flow within a tract leading from the artery to the mass consistent with pseudoaneurysm neck, and a typical “to and fro” Doppler waveform in the pseudoaneurysm neck (3).

Several therapeutic strategies have been developed to treat this complication. They include ultrasound-guided compression repair (UGCR), surgical repair, and minimally invasive percutaneous treatments (thrombin injection, coil embolization and insertion of covered stents)(1).

UGCR has become the preferred line of treatment for pseudoaneurysms at many institutions. The introduction of this method in 1991 by Fellmeth et al (4) has significantly reduced the need for surgical repair of FAP. It

has been shown to be a safe and cost-effective method for achieving pseudoaneurysm thrombosis(3). However, UGCR has considerable drawbacks including long procedure time, discomfort to patients and a relatively high recurrence rate in patients receiving anticoagulant therapy (as high as 25% to 35%)(3). UGCR has been shown to be less successful in patients with large FAP (i.e., larger than 3 cm to 4 cm in diameter) and those who cannot tolerate the associated discomfort(5). The procedure carries an overall complication rate of 3.6% and risk of rupture of 1%(3). Complications include acute pseudoaneurysmal enlargement, frank rupture, vasovagal reactions, deep vein thrombosis, atrial fibrillation and angina(3). Moreover, UGCR requires the availability of an ultrasound device and the presence of skilled personnel during the procedure. The technique involves applying compression on the pseudoaneurysm neck with the ultrasound transducer until the flow within the neck is obliterated. Pressure is applied for a period of 1 minute, with the procedure repeated 10 times. At the end of each period compression is released briefly to assess pseudoaneurysm patency and to reposition the transducer. Care must be taken to avoid compromising flow within the underlying femoral artery. After successful thrombosis patients should be kept supine for a few hours, with the affected leg in the stretched position. Contraindications to this technique include inaccessible site, limb ischemia, infection, large hematomas with overlying skin ischemia, compartment syndrome and prosthetic grafts (5).

In our patient surgical repair of pseudoaneurysm would have been a high risk procedure considering his cardiac condition. It is unfortunate that most pseudoaneurysms occur in patients least tolerant to general anesthesia, vascular reconstruction and associated blood loss. In the event of surgery the antiplatelet medications should have been stopped which would have increased his risk for another coronary event. Hence, by this UGCR technique the FAP was successfully treated and his antiplatelet medication was continued during the entire course. As this procedure is noninvasive there was no additional cardiovascular risk. The post procedure hospital stay was also very short compared to surgical repair of FAP.

We recommend UGCR as the treatment of choice in CAD patients with FAP as it is a non invasive effective procedure in these patients with high surgical risk.

REFERENCES:

1. Hamraoui K, Ernst SM, van Dessel PF, Kelder JC, ten Berg JM, Suttorp MJ, Jaarsma W, Plokker TH. Efficacy and safety of percutaneous treatment of iatrogenic femoral artery pseudoaneurysm by biodegradable collagen injection. *J Am Coll Cardiol.* 2002; 39:1297–1304.

2. Messina LM, Brothers TE, Wakefield TW, Zelenock GB, Lindenauer SM, Greenfield LJ, Jacobs LA, Fellows EP, Grube SV, Stanley JC. Clinical characteristics and surgical management of vascular complications in patients undergoing cardiac catheterization: interventional versus diagnostic procedures. *J Vasc Surg.* 1991; 13:593–600.
3. Eisenberg L, Paulson EK, Kliewer MA, Hudson MP, DeLong DM, Carroll BA. Sonographically guided compression repair of pseudoaneurysms: further experience from a single institution. *AJR Am J Roentgenol.* 1999;173:1567–1573.
4. Fellmeth BD, Roberts AC, Bookstein JJ, Freischlag JA, Forsythe JR, Buckner NK, Hye RJ. Postangiographic femoral artery injuries: nonsurgical repair with US-guided compression. *Radiology.* 1991;178:671–675.
5. O'Sullivan GJ, Ray SA, Lewis JS, Lopez AJ, Powell BW, Moss AH, Dormandy JA, Belli AM, Buckenham TM. A review of alternative approaches in the management of iatrogenic femoral pseudoaneurysms. *Ann R Coll Surg Engl.* 1999;81:226–234.