Surgical Approach To A Giant Post Cardiac Catheterization Pseudoaneurysm After Unsuccessful Duplex Ultrasound-Guided Compression

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Abstract
Femoral artery pseudoaneurysm is a significant problem in patients undergoing diagnostic catheterization. In the study we present our surgical approach to a giant post cardiac catheterization pseudoaneurysm after unsuccessful Duplex ultrasound-guided compression. Surgical repair of pseudoaneurysms was the treatment of choice.

INTRODUCTION
Catheterizations and endovascular procedures in which the femoral artery is cannulated are sometimes complicated by iatrogenic pseudoaneurysms (1). Pseudoaneurysms after arterial catheterization occur with the extravasation of blood from vessel wall defect due to hemostatic failure and the circumscription of the extravasated blood by a pseudo capsule (2,3). Femoral pseudoaneurysms may complicate up to 8% of vascular interventional procedures. Small pseudoaneurysms can spontaneously clot, but sometimes definitive treatment is needed (4).

CASE PRESENTATION
Our patient was a 50-year-old man who underwent coronary angiography 2 months ago in our institute. Soon after the angiography, he was admitted to the clinic again because a small swelling appeared in his right groin (Figure 1). This complaint developed 3 weeks after coronary angiography. Color Doppler ultrasound identified a pseudoaneurysm of the right common femoral artery with dimensions of 45x30x50 mm. The neck of the aneurysm was measured as 4 mm (Figures 2, 3 & 4).
Duplex ultrasound-guided compression was performed to our case, achieving a prominent regression in the dimensions of the mass. He was then discharged after obtaining similar amplitudes in the distal pulses.

The patient applied to our clinic with a pulsatile mass at his right groin, which was enlarged and became giant-sized in the last one month. Physical examination of the patient revealed a giant mass at the right femoral region (Figure 5).

His right leg was slightly cold and peripheral pulses were weaker compared to the left leg. There was pulsation on the mass. Ankle/arm index was 120/130=0.9 at the right side and 140/130=1.1 at the left side. Lower extremity venous ultrasonography was performed using color Doppler ultrasonography (CDUSG) and revealed a 8-cm diametered giant hematoma and hemorrhagic liquid areas. In the right groin, the mass was measured as 41.2x75.2 mm, located
over the femoral artery. This mass was consistent with pseudoaneurysm (Figures 6&7). And the “to-and-fro” flow waveform pattern was thought to indicate pseudoaneurysm.

**Figure 6**
Figure 6

[Image 6]

Femoral artery and distal part of the superficial femoral artery were freed with attentive dissection and nylon tapes were placed around the artery. After administering 1cc heparin (=5,000 IU) intravenously, bleeding was controlled with vascular clamps. The pseudoaneurysm capsule of the 8x5x4 cm organized thrombus mass was removed (Figures 8&9).

**Figure 8**
Figure 9

[Image 8]

**Figure 9**
Figure 0

[Image 9]

Femoral vein and the nerve near the artery were intact. Initially, retrograde arterial flow was observed and since it was appropriate for primary repair. The repair was performed primarily (Figure 10).

The patient underwent surgery. The patient was operated under local anesthesia with sedation, in supine position. Aneurysm was determined with skin incision parallel with right femoral artery course. Proximal part of the common
A closed drainage system was placed in the sac of the giant aneurysm. All distal pulses were similar to the opposite ones during postoperative period. Microbiological culture results of the saccular material were negative and pathological examination revealed the pseudoaneurysm. He was discharged on the 5th post-operative day without any complications. One month after the operation, there was no change in his distal pulses.

DISCUSSION

Development of an arterial pseudoaneurysm is a common complication following cardiac catheterization. Luedde et al. analyzed data from 6,300 patients who received left heart catheterization. One day after the procedure, approximately 10% of the patients were examined with duplex sonography. In 204 patients (3.0%), a pseudoaneurysm of the femoral artery was diagnosed (5).

The aim of the study of Chatterjee et al. was to report the incidence of pseudoaneurysm after arterial catheterization. During a 3-year period 9051 patients underwent 7312 cardiac catheterizations and 1739 peripheral percutaneous transluminal coronary angioplasty procedures. Patients suspect of pseudoaneurysm were referred for a color Doppler ultrasound examination. Pseudoaneurysm occurred more frequently after interventional procedures with new devices (valvuolasty 2.3%, stent 3.2%) than after conventional catheterization diagnostic cardiac catheterization 0.2%, electrophysiology 1.3%, percutaneous transluminal coronary angioplasty 0.2%). The incidence of pseudoaneurysm after peripheral percutaneous coronary transluminal angioplasty, including intra-arterial lysis and stent, was 1%. The use of complex interventional catheterization procedures leads to an increased frequency of pseudoaneurysms compared with conventional angiography and percutaneous transluminal coronary angioplasty (6).

In the study of Popovic et al. 11992 consecutive patients who underwent cardiac catheterization via femoral artery were studied over a period of four years. 76 femoral pseudoaneurysm (FPA) were diagnosed over the study period accounting for a global incidence of 0.6% procedures. By univariate analysis, interventional procedure, rhythmologic procedure, sheath/>=6F and left groin puncture were FPA risk factors. By univariate analysis, PFA diameter larger than 4 cm, the use of anticoagulation or GPIIbIIIa inhibitors and ultrasound guided compression (UGC) under anticoagulation are predictive factors of need for FPA surgical repair. By multivariate analysis, FPA diameter>4 cm and use of GPIIbIIIa inhibitors are independent predictive factors of FPA’s surgical treatment (7).

Sonographically guided manual pseudoaneurysm compression procedure is less effective when the patient's blood is anticoagulated and when the pseudoaneurysm is large (8). The procedure does not appear to be effective also in the patients with an arteriovenous fistula (9). The procedure carries an overall complication rate of 3.6% and a risk for rupture of 1% (8).

Pseudoaneurysms may occur months after the catheterization. Thus, the patients must be followed closely for early diagnosis and treatment. Thanks to early diagnosis and treatment, the incidence of secondary complications decreases. Early diagnosis and treatment is very important for iatrogenic vessel injuries (10). Delayed treatment can lead to extremity loss or death.

Pseudoaneurysm complications include rupture, thrombosis, infection, adjacent vessel and nerve compression and embolization of peripheral vessels (11,12). Rupture is seen in approximately 6% of the cases (2).

The sensitivity and specificity of CDUSG in the diagnosis of femoral pseudoaneurysm are 94% and 97%, respectively (13). Its advantages are low cost, utility in various treatment choices and time saving. Besides helping the diagnosis, it gives detailed information about dimensions of pseudoaneurysms, morphology, neck anatomy, flow and relation with adjacent vessels (14). Pulsatile mass, "to and fro" blood flow and irregular vessel wall at CDUSG.
Surgery has traditionally been considered the ‘gold standard’ treatment, although it is not without risk in patients with severe cardiovascular disease. Less invasive treatment option such as Duplex ultrasound-guided compression is available, however, evidence of its efficacy is limited (4). Patients with a pseudoaneurysm with a wide “neck” should be treated surgically (5).

In conclusion; femoral pseudoaneurysm is an important complication of invasive cardiac procedures. This may require generally surgical repair (15). Ultrasound-guided compression is not always successful; in these patients, a period of conservative management with repeat ultrasound scanning is appropriate to allow for the possible spontaneous thrombosis of the pseudoaneurysm. Surgical closure is needed in those patients whose pseudoaneurysm is enlarging, painful or remain patent (15). FPA size, level of puncture and the use of GPIIbIIIa inhibitors are independent predictive factors of need for surgical therapy (7). Educating the staff nurses about the pseudoaneurysms and following these patients closely shall decrease the rate of this serious complication (16,17).

References
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