

# Ultrasound diagnosis and Management of Post-Catheterization Femoral Artery Pseudoaneurysm

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## ABSTRACT

**Aim:** To make the provisional etiological diagnosis on the basis of history, physical examination and noninvasive investigations and to start the treatment immediately.

**Study design:** prospective and comparative study.

**Duration of study:** prospective and comparative study.

Place of study: Ch Pervaiz Elahi Institute of Cardiology, Multan.

**Methodology:** Twenty male patients were analyzed with signs and symptoms of Acute Coronary Artery syndrome (ACS). Cardiac angiography was advised for evaluation of the coronary arterial tree. Next day on examination of the punctured area pain, redness and swelling of the anterior aspect of the thigh was noticed and referred to radiology department for the evaluation of the involved region to document the presence of hematoma or fresh bleed.

**Results:** On grey scale soft tissue swelling and haematoma observed but in addition a cystic pulsatile mass was noted that was connected to the main femoral artery through a narrow neck and on Doppler evaluation ying yang pattern of flow was observed that on spectral analysis confirmed our impression of pseudo aneurysm (PSA). After that ultrasound guided direct manual compression of the neck was applied to the lesion in successive intervals until the characteristic clinical signs disappeared. Then a compression bandage was applied for 24 hours.

**Conclusion:-** Ultrasound with Doppler plays a crucial task in the diagnosis of iatrogenic vascular abnormalities. USG demonstrates the crater of the PSA, its size and link with the femoral artery.

**Key words:** PSA, ACS, ying yang,

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## INTRODUCTION

A pseudo aneurysm (PSA) is a pulsatile protuberance that communicates with an artery through a defect in the arterial wall. Clinically a pseudo aneurysm is assumed when there is a pulsatile bulge following a recent arterial prick. There may be associated bruit or palpable kick and to-and-fro murmur<sup>1</sup>. A femoral artery PSA is a type of "bubble" on the femoral artery. An opening in the artery leads to ooze of blood from the femoral artery. This hematoma develops a wall around it and the hematoma liquefies and forms a pulsating "fizz" on the artery. This is called a pseudo aneurysm (Figure-1). A pseudo aneurysm, like any aneurysm, can rupture and cause bleeding or loss of limb. A pseudo aneurysm can develop on the femoral artery due to any penetrating injury of the artery. The most common penetrating "damage" of the femoral artery occurs during cardiac catheterization performed via femoral artery with a reported incidence of 0.1-5.3%<sup>2</sup>.

It is more common in the presence of large introducer sheaths, aggressive anticoagulation and complex interventions. Other causes include inadequate density, trauma, infection, drug addiction, hypertension, calcified artery or faulty puncture technique<sup>3</sup>. Complications can frequently occur and include rupture and the risk of rupture increases with size, infection, distal embolization, necrosis of the overlying skin and pressure upon the adjacent neurovascular structures.

## METHODOLOGY

This open, prospective and comparative study was carried out at CPEIC Hospital Multan from prospective and comparative study prospective and comparative study. Later the provisional diagnosis was compared with the USG diagnosis. All data was analyzed by using SPSS.

## RESULTS

Ultrasound with Doppler plays a crucial task in the diagnosis of these iatrogenic vascular abnormalities. It demonstrates the crater of the PSA, its size and link with the femoral artery. A swirling outline of blood

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flow may be seen in the PSA (Fig.-2) and the speed can be measured in the PSA, its neck and the femoral artery. Documentation of the to-an-fro flow with spectral Doppler is essential to making the diagnosis.

On Doppler evaluation Ying - Yang pattern is typical of pseudo aneurysm that reflects swirling flow. In Chinese philosophy, the concept of ying-yang which is often referred to in the West as "yin and yang", literally meaning "shadow and light", is used to describe how polar opposites or seemingly contrary forces are interconnected and interdependent in the natural world, and how they give rise to each other in turn in relation to each other<sup>3,4</sup>. In Doppler it actually results from the coming in and out of blood flow from the pseudo aneurysm that is captured as red and blue (Fig.3). Red means coming blood toward the probe that actually means flow coming into the PSA cavity and blue means going away from the probe that means blood going out of the PSA cavity<sup>5</sup>.

Fig. 1

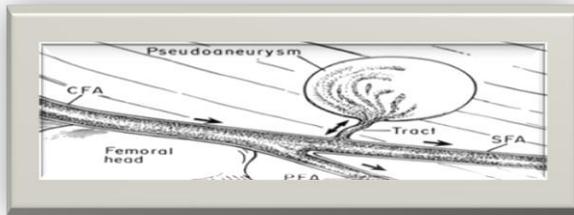


Fig.2

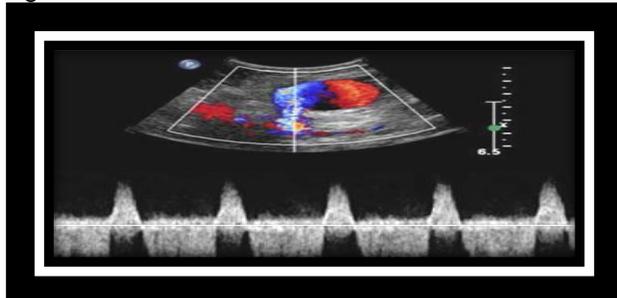


Fig. 3



Fig. 4

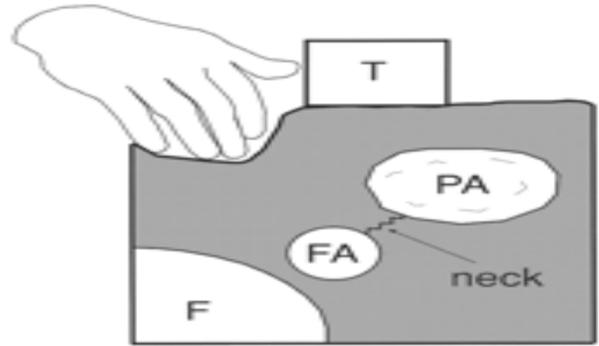
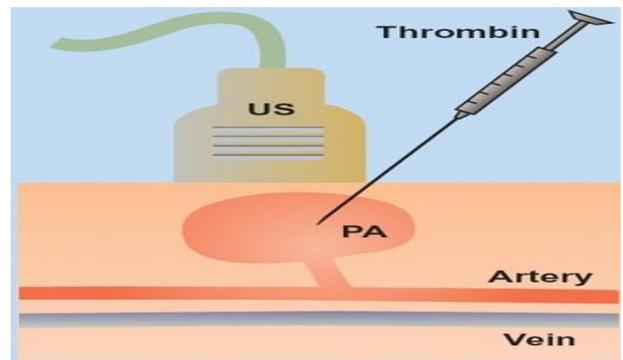


Fig.5



## DISCUSSION

Treatment options of femoral artery PSA includes conservative measures, sonography guided solidity, sonography guided manual compression, coil embolization or surgical repair. In recent years ultrasound guided thrombin injection is gaining popularity due its immediate results<sup>6</sup>.

In ultrasound guided compression the neck of the aneurysm is identified and compressed by the transducer that results in vascular status and resultant thrombosis. Although it is very successful procedure but the drawbacks are the prolonged compression time and patient discomfort. Similarly, manual compression as in our case in which the neck of the aneurysm is identified and signpost is applied on the skin surface and then forceful manual compression for a maximum of 1 hour (Fig.-4).

Then a solidity bandage can be applied for 24 hours. If a PSA persists the whole process can be repeated. While firmness is relatively safe and useful, it has substantial limitations. Specifically, the duration of compression is often lengthy. The actions are painful and must be performed by using intravenous conscious sedation. In addition, the success rate of US-guided compression is only 71% and is even lower when patients undergo anticoagulation. Finally, some PSA,s are not amenable to compression,

including those in which it is not possible to arrest flow in the PSA neck, those associated with exquisite groin tenderness, and those arising above the inguinal ligament. Body, habits size, depth, and number of chambers, as well as concurrent anticoagulation may border the success of USG compression<sup>6,7,8</sup>.

Thrombin inoculation has much compensation including reduced procedure time, no requirement for sedation or local anesthetic and a high technical success rate and minimal risk of complications.

Informed consent is obtained and distal pulses are confirmed manually and documented. Under ultrasound guidance, a 21-to 26-gauge needle is initiated into the periphery of the PSA. The needle tip is envisaged and positioned at a site distant from the neck of the PSA (Figure-5). 0.5-1.0mL (50-100 U) of thrombin is slowly injected at a rate of approximately 1 mL/10 sec under continuous ultrasound scanning. A period of 5-10 sec is allowed to elapse before additional thrombin is injected. Results are monitored continuously with grey and color-flow Doppler sonography. Injection is stopped when no further flow is acknowledged in the PSA. When possible, the neck of the PSA must be occluded manually or with the sonographic probe during the injection method<sup>9</sup>. The achievement rate of the patients treated with therapeutic levels of anticoagulants. Treatment can usually be complete thrombin injection reported in the literature has been consistently high, at an average of 93%, even within some minutes<sup>9,10</sup>.

## CONCLUSION & RECOMMENDATIONS

Ultrasound with Doppler plays a crucial task in the diagnosis of iatrogenic vascular abnormalities. USG

demonstrates the crater of the PSA, its size and link with the femoral artery.

## REFERENCES

1. Norwood M. The changing face of femoral artery false aneurysms. *Euro J Vasc Endovasc Surg* 2004; 27(4): 385-8.
2. Morgan R. Current treatment methods for postcatheterization pseudoaneurysms. *J Vasc Interv Radiol* 2003; 14(6): 222..
3. Ferguson JD, Whatling PJ, Martin V. Ultrasound guided percutaneous thrombin injection of iatrogenic femoral artery pseudo aneurysms after coronary angiography intervention. *Heart* 2001; 85: 5.
4. Etemad-Rezai R, Peck DJ. Ultrasound-guided thrombin injection of femoral artery pseudo aneurysms. *Can Assoc Radial J* 2003; 54: 118-20.
5. Paulson EK, Sheafor DH, Kliewer MA. Treatment of iatrogenic femoral arterial pseudoaneurysms: comparison of US-guided thrombin injection with compression repair. *Radiol* 2000; 215: 403-8.
6. Engelke C, Quarmby J, Ubhayakar G. Autologous thrombin: a new embolization treatment for traumatic intrasplenic pseudoaneurysm. *J Endovasc Ther* 2002; 9: 29-35.
7. Kang SS, Labropoulos N, Mansour A. Percutaneous ultrasound guided thrombin injection: a new method for treating post-catheterization femoral pseudo aneurysms. *J Vasc Surg* 1998; 27: 1032-8.
8. Sheiman RG, Brophy DP. Treatment of iatrogenic femoral pseudo aneurysms with percutaneous thrombin injection: experience in 54 patients. *Radiol* 2001; 219: 123-7.
9. Olsen DM, Rodriguez JA, Vranic M. A prospective study of ultrasound scan-guided thrombin injection of femoral pseudo aneurysm: a trend toward minimal medication. *J Vasc Surg* 2002; 36: 779-82.
10. Quarmby JW, Engelke C, Chitolie A. Autologous thrombin for treatment of pseudoaneurysms. *Lancet* 2002; 359: 946-7.